

ISO 9000 & TQM: SUBSTITUTES OR COMPLEMENTARIES? AN EMPIRICAL STUDY IN INDUSTRIAL COMPANIES

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After analysing a sample of 442 of the biggest Spanish manufacturing companies, some evidence about the influence of Total Quality Management (TQM) on the companies' operating performance has been obtained. However, companies applying TQM together with the ISO 9000 standards did not show positive results. This fact leads us to believe that, despite the beliefs of ISO 9000 as a good first step in the way of implementing TQM, once implemented some ISO 9000 principles are in contradiction with TQM philosophy. These non-congruent systems applied together would cause the company to obtain fewer benefits than only one of them. The study concludes that when ISO 9000 and TQM are applied simultaneously, the resultant benefits to the company are no better than those experienced if either system were applied in isolation.

KEY WORDS: *TQM, ISO 9000, Quality Management.*

Introduction

The growing interest in quality management over the last two decades can be tested by the number of scientific publications on this subject (Martínez *et al.*, 1998). Since 1987, when the ISO 9000 series of standards began, a great number of papers about motivation for registration, costs and benefits of certification and its effects upon the company's performance have been published. (Rayner and Porter, 1991; Askey and Dale, 1994; Brecka, 1994; Vloeberghs, 1996; Ebrahimpour *et al.*, 1997; Meegan and Taylor, 1997; Brown *et al.*, 1998, Anderson *et al.*, 1999; Casadesús *et al.*, 1999; Huarng *et al.*, 1999; Hughes *et al.*, 2000; Martínez Fuentes *et al.*, 2000a; Martínez Fuentes *et al.*, 2000b; Casadesús and Jiménez, 2000; Romano, 2000; Sun, 2000; Withers and Ebrahimpour, 2000; Gotzamani and Tsiotras, 2002) Most of these papers were descriptive. Many other researchers have also analysed the impact of TQM implementation on business performance (Elmuti and AlDiab, 1995; Mohrman *et al.*, 1995; Powell, 1995; Hendricks and Singhal, 1996; Forker *et al.*, 1997; Choi and Eboch, 1998; Easton and Jarrell, 1998; Adams *et al.*, 1999; Dow *et al.*, 1999; Terziovski and Samson, 1999; Hua *et al.*, 2000; Terziovski and Samson, 2000; Zhang, 2000; Hendricks and Singhal, 2001a; Hendricks and Singhal, 2001b; Shetty, 1993). A minor group of

researchers has compared the joint effects of TQM and ISO 9000 and they agree in pointing out that TQM implementation leads to better results in more aspects than ISO 9000 certification (Terziovski *et al.* , 1997). However, one of the benefits attributable to the standard is that it constitutes a good first step towards a TQM system, raising awareness on quality amongst workers and creating a good climate to implement it (Taylor, 1995; Tummala and Tang, 1996; Baena López, 1998; Skrabec, 1999; Sun, 2000; Escanciano *et al.* , 2001). There is even another group of writers that affirm that the ISO 9000 certification has more impact on company performance when it is implemented with the objective of continuing and finally implementing a TQM system (Brecka, 1994; Meegan and Taylor, 1997; Huarng *et al.* , 1999; Hughes *et al.* , 2000; Sun, 2000; Gotzamani and Tsiotras, 2002). However, there is a lack of research on how an ISO 9000 certified company should operate until the successful implementation of a TQM system.

ISO 9000:1994 certification includes in its description elements that could be equivalent to some of the TQM principles. In fact, Rao *et al.* (1997) found in a big sample made up of companies acting in many countries that those companies that were ISO 9000-registered had higher levels of TQM than non-registered companies. However, a recent replication of this study in Singapore (Quazi *et al.*, 2002) has not been able to prove the same relationship. In addition, the standard includes some other elements that could be contrary to the TQM system. The lack of flexibility, the bureaucracy and the great number of controls required could be some of them.

Based on these postulates, we ask ourselves if the path towards a TQM system from the ISO 9000 certification would not end with the elimination of the registration. At the beginning, registration could help the company with those principles according to the rules of the TQM system. However, once the TQM system is implemented, those other points in which both systems do not agree could disturb company efficiency and consequently companies could obtain even fewer benefits than by implementing only one of them. That is to say, if a company is a TQM company, ISO 9000 can be unnecessary and therefore, a waste. In order to analyse this problem, the paper has been organised into six main sections. Section 2 provides a critical analysis of literature relating to the differences and similarities between ISO 9000 and TQM. Section 3 review the empirical research studies on the effect of ISO 9000 and TQM on company results, leading into the specific study objectives and the hypothesis that are proposed. Section 4 comments upon the methodology for testing such hypotheses. The

presentation of results and the discussion of findings are undertaken in section 5. The main conclusions of the research study are summarised in Section 6.

ISO 9000:1994 and TQM: Differences and similarities

In spite of the fact that in the business field the TQM and ISO 9000 systems are considered to offer the same level of quality practices, there are several differences between their principles that place certification far below TQM. In order to analyse differences and similarities it is necessary to first define what TQM is. Several writers have attempted to define the key dimensions that make up TQM including: Ahire *et al.* (1996), Dale *et al.* (1994) and Flynn *et al.* (1994). More recently, Martinez-Lorente *et al.* (2000) rationalised these into eight dimensions: top management support, workforce management, employee attitudes and behaviour, customer relationship, supplier relationship, product design process and process flow management (see Table I)

TAKE IN TABLE I.

The ISO 9000 set of international standards was created in 1987 with the objective of standardising quality systems. They have become a pre-requisite in many companies to be a supplier for their industrial clients. In fact, this objective is the first discordant element with the TQM system, whose objective is to improve management through compliance with certain principles, but applying them in a flexible way according to company characteristics.

TABLE I: TQM Dimensions

DIMENSIONS	DESCRIPTION
TOP MANAGEMENT SUPPORT	Top management commitment is one of the major determinants of successful TQM implementation. Top management has to be the first in applying and stimulating the TQM approach, and they have to accept maximum responsibility for the product and service offered. Top management also has to provide the necessary leadership to motivate all employees.
QUALITY DATA AND REPORTING	Quality information has to be readily available and the information should be part of the visible management system. Records about quality indicators have to be kept, including scrap, rework and cost of quality.
WORKFORCE MANAGEMENT	Workforce management has to be guided by the principles of: training, empowerment of workers and teamwork. Adequate plans for personnel recruitment and training have to be implemented and workers need the necessary skills to participate in the improvement process.
EMPLOYEE ATTITUDES & BEHAVIOUR	Companies have to stimulate positive work attitudes, including loyalty to the organisation, pride in work, a focus on common organisational goals and the ability to work cross-functionally.
SUPPLIER RELATIONSHIP	Quality is a more important factor than price in selecting suppliers. Long-term relationships with suppliers have to be established and the company has to collaborate with suppliers to help improve the quality of products/services.
CUSTOMER RELATIONSHIP	The needs of customers and consumers and their satisfaction have always to be kept in mind by all employees. It is necessary to identify these needs and their level of satisfaction.
PRODUCT DESIGN PROCESS	All departments have to participate in the design process and work together to achieve a design that satisfies the requirements of the customer, according to the technical, technological and cost constraints of the company.
PROCESS FLOW MANAGEMENT	Housekeeping along the lines of the 5S concept. Statistical and non-statistical improvement instruments should be applied as appropriate. Processes need to be mistake-proof. Self-inspection should be undertaken using clear work instructions. The process has to be maintained under statistical control.

Source: Martinez-Lorente et al., 2000

Nevertheless, in spite of their different objectives, both systems have some common elements. This is the reason many researchers consider ISO 9000 as a first step towards TQM (Taylor, 1995; Tummala and Tang, 1996; Baena López, 1998; Skrabec, 1999; Sun, 2000; Escanciano *et al.*, 2001). Some of the common elements are:

- (1) Process flow management. ISO 9000 is basically a list of norms on how to manage the process. (Lee *et al.* , 1999). A good application of ISO 9000 could lead to more controlled processes although statistical process control is not a pre-requisite of ISO.
- (2) Information and data gathering. Both models involve the obtention of data on quality. The difference lies in the fact that ISO 9000 does not require analysis of the data and TQM only requires the gathering of the data if it is with the aim of analysis use of the results to improve quality. (Tummala and Tang, 1996; Lee *et al.*, 1999; Gotzamani and Tsiotras, 2001).
- (3) Use of statistical tools. ISO 9000 includes this requirement (point 4.20) but a company may receive certification without applying any statistical tool (Lee *et al.* , 1999).

In line with previous points, it can be accepted that a company certified by ISO 9000 may have gone part of the way towards TQM. However, it is only a first step, not its end, because there is a large number of TQM requirements that ISO 9000 does not satisfy:

- (1) Continuous improvement. This is one of the pillars of TQM (Deming, 1982). ISO 9000 introduces improvement only through prevention and correction of non conformities. This is a passive focus, contrary to the pro-activeness of TQM (Lee *et al.* , 1999; Zhu and Scheuermann, 1999).
- (2) Customer focus. ISO 9000 only requires the application of a set of procedures focused on the fulfilment of design specifications. The customer is king in a TQM environment, everything is done to obtain satisfied customers (Lee *et al.* , 1999).
- (3) Workforce development and participation. ISO 9000 does not give special importance to this subject (Tummala and Tang, 1996; Gotzamani and Tsiotras, 2001).

Moreover, ISO 9000 includes elements that are opposite to TQM principles, such as:

- (1) Excessive bureaucracy. This bureaucracy may lead to demotivation and uneasiness amongst employees.

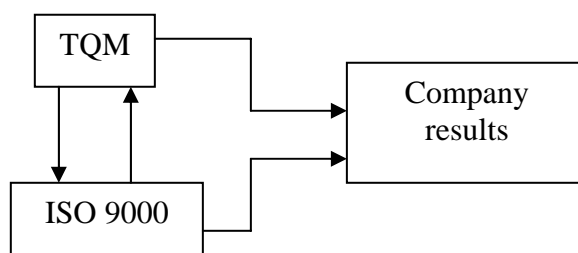
- (2) Lack of flexibility (Gotzamani and Tsiotras, 2001). The correct execution of the norm may obstruct the critical change of process aimed at continuous improvement.
- (3) ISO 9000 may force companies to apply controls on products received from suppliers when TQM upholds the suppression of controls and the set up of a relationship with suppliers based on mutual trust.
- (4) ISO 9000 may force companies to apply excessive controls on intermediate and final products. TQM puts emphasis on prevention, not on inspection; however, ISO 9000 gives importance to inspection (Tummala and Tang, 1996).

The effect on company results of TQM and ISO 9000.

The effect of TQM and ISO 9000 on company results has been widely analysed in the literature, but there is no agreement on their connection (Rahman, 2001). Figure 1 presents the usual model of explanation of the effect of TQM and ISO 9000 on company results.

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FIGURE 1: Conceptual model of the effect of TQM and ISO 9000 on company results.



Source: Rahman (2001)

Three types of effect on results can be analysed:

- (1) Impact of TQM on company results.
- (2) Impact of ISO 9000 on company results.
- (3) Joint effect of TQM and ISO 9000 on company results.

The first exposed relationship has been widely analysed and researchers have generally found a positive effect of TQM on company results. There are papers

analysing the relationship of TQM with product quality and other non financial results (Shetty, 1993; Elmuti and AlDiab, 1995; Mohrman *et al.*, 1995; Powell, 1995; Forker *et al.*, 1997; Choi and Eboch, 1998; Dow *et al.*, 1999; Terziovski and Samson, 1999; Terziovski and Samson, 2000; Zhang, 2000). Other papers have analysed the effect on financial results (Easton and Jarrell, 1998; Hua *et al.*, 2000; Hendricks and Singhal, 2001a) and there are also papers analysing the effect of TQM on stock market value (Hendricks and Singhal, 1996; Easton and Jarrell, 1998; Adams *et al.*, 1999; Hendricks and Singhal, 2001b).

There are also papers that take a step forward and analyse how the different dimensions of TQM affect company results. Using different dimensions of TQM defined by different researchers (Saraph *et al.*, 1989; Anderson *et al.*, 1994; Flynn *et al.*, 1994; Ahire *et al.*, 1996; Black and Porter, 1996), these papers test the direct relationship between each TQM dimension and company results (Mohrman *et al.*, 1995; Powell, 1995; Forza and Filippini, 1998; Anderson and Sohal, 1999; Dow *et al.*, 1999; Samson and Terziovski, 1999; Curkovic *et al.*, 2000; Martínez-Lorente *et al.*, 2000; Escrig Tena *et al.*, 2001). Most of them agree in stating that the most influential dimensions are those that Powell (1995) considers as intangible, behavioural factors like leadership, organisational skill and culture, executive commitment, open organisation and empowerment. Dow *et al.* (1999) reach similar conclusions. They found that only 3 TQM dimensions -employee commitment, shared vision and customer focus- had a positive relationship with quality of product. Anderson and Sohal (1999) found that the most important TQM dimensions were leadership and customer focus. Samson and Terziovski (1999) identified the variables of leadership, workforce management and customer focus as most important. Therefore, TQM dimensions of top management support, workforce management, employee attitudes and behaviour and customer relationship, although with different names, are the most important according to the literature.

It is important to point out that the literature shows that the dimensions of TQM that best influence companies' results (the soft variables) are those that have a lesser weight in ISO 9000. Moreover, the points of TQM with more importance for ISO 9000 do not have a significant positive effect on company results.

There is a great number of papers on ISO 9000, but most of them are merely based on case studies or are descriptive or prescriptive (Ebrahimpour *et al.*, 1997; Withers and

Ebrahimpour, 2000). Moreover, only a small number analyse the relationship between ISO 9000 and company results. This relationship is not clear according to the literature. Some papers show a positive relationship between certification and results (Abraham *et al.*, 2000; Casadesús and Jiménez, 2000; Romano, 2000; Gupta, 2000; Withers and Ebrahimpour, 2000; Santos and Escanciano, 2002). The positive results shown by many of them are often mainly based on improvements in the rate of defects (Sun, 2000; Withers and Ebrahimpour, 2001) Other papers present a less optimistic vision of its benefits (Terziovski *et al.*, 1997; Simmons and White, 1999; Lima *et al.*, 2000; Sun, 2000; Hua *et al.*, 2000; Aarts and Vos, 2001; Singels *et al.*, 2001; Wayhan *et al.* 2002). Heras *et al.* (2002b) found a positive relationship between company results and ISO 9000 certification. However, they later proved that the relationship was in the other direction, that is, that more profitable companies implemented the ISO 9000 certification more (Heras *et al.*, 2002a). Häversjö (2000) had reached the same conclusion for Danish industry.

The most important reasons for obtaining ISO 9000 certification are of external type, that is, they try to get it either because of pressure from clients and suppliers or as a marketing tool (Rayner and Porter, 1991; Askey and Dale, 1994; Vloeberghs, 1996; Ebrahimpour *et al.*, 1997; Brown *et al.*, 1998, Anderson *et al.* , 1999; Casadesús *et al.*, 1999; Hughes *et al.* , 2000; Martínez Fuentes *et al.*, 2000a; Martínez Fuentes *et al.* , 2000b; Withers and Ebrahimpour, 2000). However, several papers show that the results of certification depend on the type of company motivation for deciding to get it (Brecka, 1994; Meegan and Taylor, 1997; Huarng *et al.*, 1999; Hughes *et al.*, 2000; Sun, 2000; Gotzamani and Tsiotras, 2002, Terziovski *et al.*, 2003). These authors state that companies that obtain ISO 9000 certification motivated by external reasons but who do not believe that it can really help them to improve quality and efficiency get worse results than those that believe that ISO 9000 can be a good way to reduce quality costs. In this sense, Sun (2000) suggests that in order to get benefits from ISO 9000 certification, this norm must be seen as a way towards TQM.

Despite the great number of papers analysing TQM and ISO 9000, there are very few works that longitudinally analyse the evolution of companies that apply them (Meegan and Taylor, 1997). So, although many papers defend certification as a first step towards TQM, almost none analyse companies' evolution after certification. Some of them try to find the factors that help to move towards TQM after attaining certification.

(Meegan and Taylor, 1997) and others use case studies to give advice on how companies should continue this way (Askey and Dale, 1994; Tsiotras and Gotzamani, 1996; Williams, 1997; Quazi and Padibjo, 1998; Ho, 1999; Lee *et al.* , 1999; Zhang, 1999; Najmi and Kehoe, 2000; Van der Wiele *et al.*, 2000). Terziovski *et al.* (1997) analyse the effect of ISO 9000 on company results in two groups of firms: firms with low level of TQM implementation and firms with a high level. They concluded that ISO 9000 did not have a positive effect on company results, independent of the level of TQM implementation.

The following questions are extracted from the previous literature review:

- Does TQM have a positive relationship with company results?
- Does ISO 9000 certification have a positive relationship with company results?
- Once ISO 9000 certification is attained, does the implementation of TQM have a positive effect on company results?

As we have shown before, the answer to the first question is “yes, it does, mainly in the soft dimensions of TQM”. However, the answer to the second question is unclear. It has been shown that ISO 9000 may have a positive effect only when there is an internal belief in its benefits. The third question has not yet been studied. Although TQM and ISO 9000 may separately have a positive effect on results, some points of ISO 9000 are contradictory to TQM principles. Moreover, the TQM dimensions that have shown greater impact on company results are not included in ISO 9000. Could these contradictions lead to a loss of their benefits when TQM and ISO 9000 are jointly applied? Is ISO 9000 a waste when a company has implemented TQM?

Therefore, the hypotheses are the following:

H1: There is a positive relationship between TQM implementation and company results.

H2: There is a positive relationship between ISO 9000 certification and company results.

H3: There is not a positive relationship of TQM and ISO 9000 with company results when jointly applied.

Methodology.

Sample.

Data was gathered by a postal questionnaire. It was sent to the quality managers of the 1950 biggest Spanish industrial companies in October 2001. These companies' list was extracted from the database of the 3000 largest Spanish companies by annual sales' turnover published by the organisation "Fomento de la Producción". The Last questionnaire was received in January 2002. The questionnaire was pre-tested by a previous case study of 14 companies. The response rate was 22.7%, that is, 442 companies responded to the questionnaire.

The majority of the questionnaires were answered by quality managers (70.5%) whilst other major respondents were quality department representatives (10.5%) and plant directors (3.4%). Variance analysis indicates that the position of the respondents did not affect the responses. Some 60% of the companies in the sample are made up of Spanish companies, 21% of other European Union companies. The mean of employees was 530, within a range of 22 to 14,500. 86.1% had ISO 9000 certificate of 5.89 years on average.

Variables.

Two types of measures of company results were used for this research: the first subjective (respondents' opinions) and secondly, objective (financial data). Both types of measure have their problems. Reliability of subjective measures depends on the sincerity and good information from managers. Financial data are influenced by the sector situation and it is difficult to isolate from the analysis. Therefore, the use of both types may improve the validity of results.

The subjective measure tried to assess the operational results of the company. Managers were asked on how their companies compared with their competitors on five of the most important operational indicators:

- Production costs.
- Fast delivery.
- Flexibility to change production volume and adapt stocks.
- Rate of defects
- Cycle time.

The questions had to be responded to on a 1 to 5 scale: 1 far below competitors, 5 far over competitors and the average of the five items was calculated (RESOPER). Reliability of this measure was measured using Cronbach' alpha criteria. It was 0.65, higher than 0.6 ,the minimum acceptable level for new scales (Nunnally, 1978).

Objective measures were two:

- Rate between benefits and sales (RESSAL). This is an indicator of profitability on sales turnover.
- Rate between benefits and number of employees (RESEMP). This is an indicator of profitability on employee number.

These two measures of profitability have the advantage of avoiding the effect of company size, since they are relative and not absolute. They are productivity measures. Data showed no correlation between company size as measured by both employee number and sales turnover and the three measures of results.

Correlation amongst these three variables was computed and all were positive although correlation between RESOPER and RESSAL was not significant. The reason could be due to two factors:

- RESOPER is a measure where sector effect has been suppressed, whereas it has not been totally suppressed for RESSAL. That is to say, a company can belong to a high productivity sector, but can also have low productivity in relation to its competitors. The contrary can also happen. These companies would make the correlation between RESOPER, measured in relation to competitors and RESSAL, which can be higher for one sector than for others, disappear.
- Benefits not only depend on operational results, but also on financial results, market results and other variables. Therefore, if the weight of these variables is high, they could overshadow the effect on benefits of operational results.

Managers were also asked whether their companies were applying a TQM system and if they were certificated by ISO 9000.

Results

ANOVA analysis was used to test the hypothesis, in order to identify if difference of averages between TQM and non TQM companies and between certified and non certified companies was significant.

The results of testing hypothesis 1 are given in Table II. According to these data, TQM has a positive and significant effect only on RESOPER, whereas the effects on RESSAL and on RESEMP are negative but not significant. These results only partially confirm hypothesis 1. The explanation of these findings could be that TQM is positive enough to have an influence on operational variables such as production costs and defect rates, but its effect is not big enough to affect company total results. That is, the effect of other variables on benefits overshadow the TQM effect. The lack of effect of TQM on financial results is contradictory with Hendricks and Singhal (2001), Easton and Jarrell (1998) and Hua *et al.* (2000) findings and could also be due to the measures used for financial results.

TAKE IN TABLE II

TABLE II: Relationship between TQM and results.

		N	Average	Sig.
RESOPER	Do not apply TQM	205	3.7763	.018
	Do apply TQM	232	3.8963	
	Total	437	3.8400	
RESSAL	Do not apply TQM	194	5,55398E-02	.186
	Do apply TQM	217	4,12341E-02	
	Total	411	4,79867E-02	
RESEMP	Do not apply TQM	194	3.446145	.221
	Do apply TQM	217	2.290607	
	Total	411	2.836043	

The results on the second hypothesis are summarised in Table III. It can be deduced from the table that ISO has no significant effect on any of the measures of results. Moreover, the average of RESOPER and RESSAL is higher when companies do not have ISO 9000 certification. Therefore, hypothesis 2 is rejected and it cannot be said that ISO 9000 helps companies improve results. This finding supportst previous papers that did not find a positive relationship between ISO 9000 and results (Terziovski *et al*, 1997; Simmons, 1999; Lima *et al*, 2000; Sun, 2000).

TAKE IN TABLE III

TABLE III: Relationship between ISO 9000 and results.

		N	Average	Sig.
RESOPER	Do not have ISO	60	3.8567	.794
	Do have ISO	377	3.8374	
	Total	437	3.8400	
RESSAL	Do not have ISO	59	5,73223E-02	.473
	Do have ISO	349	4,62371E-02	
	Total	408	4,78401E-02	
RESEMP	Do not have ISO	59	2.815905	.981
	Do have ISO	349	2.848655	
	Total	408	2.843919	

In order to test hypothesis 3, four groups were defined according to the 4 combinations between the variables TQM and ISO 9000. The results are set out in Table IV.

TAKE IN TABLE IV

TABLE IV: Relationship of TQM and ISO with results.

		N	Average	Sig.
RESOPER	Neither ISO nor TQM	39	3.8205	.113
	Do ISO, do not TQM	166	3.7660	
	Do not ISO, do TQM	21	3.9238	
	Do ISO, do TQM	211	3.8935	
	Total	437	3.8400	
RESSAL	Neither ISO nor TQM	38	4,85867E-02	.258
	Do ISO, do not TQM	155	5,73077E-02	
	Do not ISO, do TQM	21	7,31296E-02	
	Do ISO, do TQM	194	3,73921E-02	
	Total	408	4,78401E-02	
RESEMP	Neither ISO nor TQM	38	1.952308	.285
	Do ISO, do not TQM	155	3.829644	
	Do not ISO, do TQM	21	4.378603	
	Do ISO, do TQM	194	2.064875	
	Total	408	2.843919	

This analysis shows that there are no significant differences for any of the 3 measures of results, supporting hypothesis 3. However, the average in results of companies that apply TQM and not ISO 9000 is bigger than the average of the other 3 combinations for the 3 measures or results. Therefore, it can not be said that any of the 4

combinations has a significant effect on results, but if this did exist, the best option would be to apply TQM and not get ISO 9000. These results could also indicate that some companies with ISO 9000 consider that they are applying TQM only by having ISO 9000 when they are not really doing no such thing. This would explain the better results of companies that claim to apply TQM and do not have ISO than companies that also claim to apply TQM and do have ISO, since, as has been shown before, TQM has a positive effect on operational results.

Conclusions

ISO 9000 and TQM have some common points. This fact may help companies that get an ISO 9000 certificate to be more akin to a TQM company. However, the literature has also showed the problems of ISO 9000 norms and the points where they and TQM are contradictory -excessive bureaucracy, lack of flexibility and others. This fact implies that when a company is applying TQM with success, ISO 9000 would only increase its costs and generate unnecessary problems.

442 companies were analysed and the analysis of the data obtained shows the following:

- TQM is positively related with operational results.
- ISO 9000 is not significantly related with results.
- Joint implementation of TQM and ISO 9000 certification does not have a significant effect on results. However, when companies apply TQM and do not have ISO 9000 certification their average results are higher although differences are not significant.

According to these research results, the main conclusion for this study is that ISO 9000 does not contribute to improve results, especially when the company is also applying a TQM policy, which does contribute to improve them. Therefore, managers that apply TQM can be reasonably confident re its success, but they should only pursue an ISO 9000 certificate when they are forced to do so by their clients. On the other hand, companies that require an ISO 9000 certification of their supplier should reflect on the fact that it does not contribute to improving suppliers' defect rates or costs, which would be the aim of requiring ISO 9000.

The non-existence of benefits of ISO 9000 does not appear to be stopping the fashion for ISO 9000. If the ISO 9000 wave continues, possession of ISO 9000 will not mean an important competitive tool since all companies in certain sectors will have it. For these sectors, ISO 9000 has meant an increase in costs without other benefits. However, the new ISO 9000:2000 includes some dimensions of TQM that were not included in the previous version. Some of these are related with the soft dimensions of TQM (workforce management and customer focus), which are the TQM dimensions most clearly related with positive results. Therefore, it is possible that this new norm will have a better effect on results than the 1994 version. The results of this research confirm the opportunity provided by these changes in the norm. Further research could investigate if the new version is more in accord with TQM and consequently impacts more on results and can be jointly applied with TQM without “disturbing” points.

The study is not without its limitations. Longitudinal research to consider the time lags of the effect of TQM and ISO 9000 on performance would be of value. TQM can be applied in different degrees and asking managers whether their companies are applying TQM or not has two problems: first, some companies that claim to follow a TQM policy may be far from a real TQM company and second, some companies that do not officially follow a TQM policy may be a real TQM company in practice.

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