The Contribution of ISO 9001 to Certified Companies: Manager and Employee Perceptions

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In the literature, several studies confirm that managers and customers have a positive perception of ISO 9001 certification, but employee perception is not mentioned, as it is often subsumed into manager perception. Yet, it is very important to have the perceptions of all employees because there may be some differences that could negatively impact the implementation of the certification.

The aims of this paper are first to compare perceptions of the various stakeholders regarding the contribution of the certification, and second to analyze if the degree of acquaintance with the ISO 9001 standard, which is assumed to be greater among managers than among other employees, is likely to explain the possible differences in perception. A questionnaire was sent to 91 certified companies in France, and 239 responses were received.

The main results show that depending on the principles of the standard, there is a difference in perception between managers, technicians, and workers. Also, the degree of acquaintance with the certification is correlated with the global level of perception: The higher the degree of knowledge, the better the perception.

Key words: employee, ISO 9001, perceptions, quality management

INTRODUCTION

In the context of global competition between companies, the adoption of quality certified standards applying to all companies has become a priority that justifies the development of certified companies all over the world. That growth can be explained by the positive returns companies are entitled to expect. Most often, they adopt the ISO standard (Afnor 2005; 2008) to differentiate themselves from competitors and improve their image or their competitiveness (Simmons and White 1999). In principle, this process of certification is voluntary, but in practice it is often recommended by business partners. In this case, companies adopt it to have a good position and satisfy their influential partners. Therefore, to be efficient, ISO 9001 standards must be considered as a process of continual improvement and perceived as such by all external stakeholders, including customers and partners, as well as in-house stakeholders, namely employees. In the literature, most of the empirical data regarding the evaluation of certifications were collected from managers and rarely from employees (Kuo et al. 2009; Larson and Sinha 1995). Yet, employee perception is very important because it follows the company's policy to implement ISO quality management systems. A bad perception could produce negative outcomes for companies.

This paper aims to first analyze some possible differences of perceptions between employees and managers regarding the eight principles of the ISO 9001 standards, and second to understand why these differences in perception occur. The author will try to learn whether the advantage held by managers over employees in terms of the amount of knowledge

needed to implement the ISO standards could explain these differences.

In the first part, the study begins by reviewing the importance of ISO 9001 standards for companies; the next section shows why it is relevant to consider the opinions of employees together with those of managers regarding the effectiveness of ISO 9001 implementation. In the second part, an empirical analysis is carried out and the results are presented.

THE IMPORTANCE OF CERTIFICATION FOR COMPANIES

ISO 9001 is one of the most widely used standards among companies in the world. It is a standard against which companies can be assessed and certified by an external agency. It provides a guarantee of the ability of the companies to satisfy quality requirements and to enhance customer satisfaction in supplier-customer relationships. The recent ISO survey of certifications (Frost 2012) shows that through the end of December 2011, at least 1,111,698 ISO 9001 certificates had been issued in 180 countries and economies. The 2011 total represents an increase of 46,913 (4 percent) over 2009, when the total topped 1 million for the first time with 1,064,785 certificates. To understand that situation, two questions must be answered: 1) What are the reasons for justifying the adoption of the ISO 9001 standard? and 2) What are the benefits for companies?

In the literature, studies have shown that the benefits of the ISO 9001 standard impact companies at various levels:

- Company performance (Iwaro and Mwas 2012; Han, Chen, and Ebrahimpour 2007; Terziovski, Power, and Sohal 2003): The effects are increased productivity, cost reduction, quality enhancement (Elmuti 1996), and increased market share.
- Financial profit (Corbett, Montes-Sancho, and Kirsch 2005; Chow-Chua, Goh, and Wan 2003)
- Internal organization improvements with enhanced internal communication and staff motivation (Casadesus, Gimenez, and Heras 2001)
- Customer relationship management (Singh 2008): Customers become brand loyal and have a better image of the company.

Unlike the benefits derived from the standard, the motivations underlying the adoption of IS0 certification by companies are more difficult to pin down. Generally, the implementation of a quality management system and its subsequent certification is a voluntary process supported by an organization's own strategy, motivations, policies, and goals (Kaziliunas 2010). However, companies can be subjected to external pressure from customers (Martinez-Costa and Martinez-Lorente 2003) or partners to adopt the certification. In that case, according to Quazi and Jacobs (2004), companies consider ISO certification as a prime goal in itself, adopt a minimalistic approach to achieving it, and thus obtain limited internal performance improvements. Another perverse effect may occur when companies focus mainly on quick and easy certification, without any real commitment to quality improvement. This may result in increasing bureaucracy and reducing flexibility and innovation (Gotzamani and Tsiotras 2001). Finally, ISO 9000 certification is not a risk-free undertaking, because the cost of certification can be very high (Anderson, Daly, and Johnson 1999). Thus, companies must anticipate the repercussions and act advisedly without constraints being imposed from their partners.

In their quality management systems, it is essential that companies consider certification as an opportunity to improve internal processes and systems, rather than simply to hang a certificate on the wall, so they can enjoy broader repercussions (Lopis and Tari 2003). Naveh and Marcus (2005) found that ISO 9000 certification alone did not provide a competitive edge, and emphasized that the standard should be adhered to by the company by reinforcing coordination with all company stakeholders and integration within the existing practices of the company. So, success in certification arises from a global process and calls on all stakeholders of a company's services. Advantages that stakeholders enjoy are interdependent (Schneider and Bowen 1992). According to these authors, only when employers treat employees as valuable resources do the latter in return treat their customers as valuable.

The workforce is the primary producer of output for customers. Their cooperation and personal commitment are essential (Mahadevappa and Kotreshwar 2004). Hence, it becomes imperative for companies to consider human resource management as a source of competitive advantage (Sureshchandar, Rajendran, and Anantharaman 2001) by taking into account their perceptions regarding the changes occurring in the company, all the more so as the patterns of employee behavior do not follow the formal policies that define the quality-related behaviors desired by management (Luria 2008).

IMPORTANCE OF AGREEMENT AND PERCEPTION OF ALL EMPLOYEES

Perception must be considered as a mental calculation derived from an interaction between a person and his or her environment, and not a passive and accurate mirror of the outside world (Nicolas 2004). So, it is essential to understand the effects of ISO 9001 implementation. If manager perception of those effects has been analyzed, employee perception has thus far received little attention (Kuo et al. 2009). Various reasons can be found for this. The first concerns the principle of the standard per se, which lists the requirements for quality management systems in order to improve company organization and increase output. Companies then consider that the work environment of employees has improved and does not require more attention and analysis. For Li, Yang, and Wu (2008) quality systems include a series of human resource procedures and practices that refer to personal development and the working environment. Consequently, companies that possess certified quality systems will be capable of improving the working environment for their employees (Rodriguez-Anton and Alonso-Almeida 2011). The second reason is that managers do not place great store in employee perception of the effects of the ISO 9001 standard. They prefer taking into account objective criteria such as the percentage of sales or profit made by companies (Han, Chen, and Ebrahimpour 2007; Madu, Kuei, and Jacob 1996) to measure the effects of the certification. Yet, employee perception is a valuable source of information for firms. For example, Lam and Robertson (2012) show that employee perception of an organization's approach to continuous improvement is a significant indicator when predicting willingness to participate in continuous improvement projects. The last explanation is that companies call more often on managers to implement the requirements of the ISO 9001 standard. So, the degree of participation in quality decisions by employees is low, since decisions on whether a process should run or stop, and whether products conform to specifications, are made by managers. Thus, one can posit the following hypothesis:

- *H1: Degree of knowledge about ISO 9001 certification differs according to employee category—managers, technicians, and workers.*

In the literature, several studies show the importance of taking into account the perceptions of all employees regarding the effects of certification. The ISO 9001 system imposes some company reorganization and encourages managers to involve employees in the decisions that affect them. To succeed, top management must be able to recognize employees as equal partners in maintaining the quality management system (Zelnik et al. 2012). In their study, Akdere and Schmidt (2008) specify that all initiatives for management of quality systems involve employees, and add that communication and in-house training are important factors to attain that goal. Consequently, employees can acquire new knowledge, see the benefits of quality management, and obtain a sense of accomplishment by solving problems. Delbridge and Whitfield (2001) show that employees have a better image of their work when they participate in the decision making. In practice, many managers have the conviction that they dare not delegate the decisions of process or product conformance to workers. As a result, employee involvement and empowerment are relegated to the least priority (Mahadevappa and Kotreshwar 2004). Yet, recognition and rewards play an essential role in inspiring employees to attain quality. So, in considering that situation, one can posit the following hypothesis:

- *H2: Perceptions of benefits of ISO 9001 certification differ according to employee category: managers, technicians, and workers.*

Employees involved in the implementation of ISO 9001 certification should have greater knowledge about the process because it is an important requirement of the standard. According to their workstation, employees must avail of some amount of information and knowledge to carry out their tasks. For example, the last versions of the ISO standard integrate the concept of "top management," which is defined as "the person or group of people supervising and controlling an organization at the highest level" with some recommendations to follow. One important recommendation is to have a wide range of knowledge and information about quality-related issues including customer needs and expectations, as well as regulatory and legal requirements for the product and/or service provided by the company (Gotzamani 2005). Another example concerns employees in contact with customers whose needs and expectations they must know and satisfy. The acquisition of those skills is made possible by training and the provision of customer information by companies. Considering this point and the arguments developed in the last hypothesis, one can posit that:

- *H3: The greater the degree of knowledge, the better the perception of the ISO 9001 standard by employees.*

To validate these three hypotheses, an empirical study was carried out in France. It is described in the following section.

METHODOLOGY

Data Collection

To collect the data, the author chose to send an online questionnaire to employees from participating companies. The questionnaire was anonymous and accessible by an Internet link. This method of collecting data presents some advantages. First, employees can choose the time they think is appropriate to answer the questionnaire, as they receive it on their personal email address. Therefore, there is no time constraint. Second, a traditional survey can be rather unwieldy to deliver, as it requires the presence of an interviewer, a paper document, and a data-logging application. The online questionnaire avoids this and enables the storage of simultaneous data, and saves time and money. The Association Qualite Management de Basse-Normandie (AQM) was in charge of dispatching the questionnaire. The aim of this organization is to promote the process of quality management in companies in Lower Normandy. So, it is a source of motivation for companies and employees to participate. The author accepted all certified industrial and services companies without distinction because the principles of the standard remain the same, even if the implementation is different. Furthermore, there are only a few studies on the differences in perception between managers and employees. This is why the author chose an exploratory overall approach based on the average perception of all participating firms to have an overview without the specificities of each firm. Ninety-one certified companies took part in the survey: 49.45 percent from the industrial sector and 50.55 percent from the service sector, with a total of 239 respondents (96 managers, 74 technicians, and 69 workers).

The Questionnaire

To build the questionnaire, the author used the 2008 edition of the ISO 9001 standard relating to the requirements for quality management systems, and ISO 9000, which provides the essential vocabulary and a set of quality management principles. The questionnaire is structured into two main parts. In the first part, respondents give their perceptions of the eight principles of the ISO 9001 standard, which are: customer focus, leadership, involvement of people, process approach, system approach to management, continual improvement, factual approach to decision making, and mutually beneficial supplier relationship. For those principles, a total of 21 questions were asked using some interval scales, which consist in assessing the perception of the ISO 9001 certification by means of several items on a seven-point scale (n=7). These questions were formulated by drawing

from interviews with five experts of ISO 9001 such as quality executives. Then, before the survey was administered, those experts gave their approval to the final items. The second part of the questionnaire deals with the way employees relate to the ISO 9001 standard and the consequences of its implementation in their work. Also, some questions of description provide information about the respondents.

Exploratory Analysis

Exploratory factor analysis was used to look at the underlying factors associated with the 21 items used in the study. Principal component analysis (PCA) was employed to extract factors, and orthogonal rotation with Varimax was applied because the author postulates the independence of the principles as their implementation leads to various consequences in companies and as a result to different perceptions by employees. Also, it is expected that the eight principles are extracted because for each of them, there are at least two corresponding particular questions.

The Kaiser-Meyer-Olkin (KMO) measure of sample adequacy and Bartlett's test of sphericity were computed to determine whether the sample size was suitable to undertake factor analysis. The figure obtained with the KMO method was 0.897, which is highly significant (Kaiser 1974), and Bartlett's test of sphericity was statistically significant ($p < 0.01$). So, these results confirm the suitability of the data for the factor analysis. Item loadings of 0.5 and above were chosen for interpretation and those with a value less than 0.5 were considered insignificant and disregarded. The last case concerns two items: one belonging to the customer focus dimension with the question, "Do you think that you understand the needs of your corporate clients?" and the other relates to the process approach dimension. The question concerned is: "Do you think that better coordination within its activities is favorable for the company?" As a result, the principal component method reduced the 21 items to 19, which were distributed under seven components, explaining nearly 80 percent of the total variance. The extracted factors along with the 19 items loadings are shown in Appendix 1.

To test the validity of the items, some different analysis was done. The first concerns the "skewness" and the "kurtosis" coefficients, which measure the lack of symmetry of a probability distribution and how high the distribution is around the mean, respectively. The results indicate a violation of the assumption of multinormality for several items (see Appendix 2), particularly concerning the process approach dimension. Nonetheless, the author decided to consider those items because in this study they are mainly used to make an analysis of variance (ANOVA), which is a very robust statistical procedure where the conditions of normality may be violated with only minor effects (Howell 1998). However, some caution may be required to interpret the results concerning those items. Then, to test the internal consistency of the scale, the author used the inter-item correlation matrix presented in Appendix 3. The author notes that the items that measure the same dimension are correlated between them ($r > 0.5$) and, with only a few exceptions, they are weakly correlated with the items belonging to the other dimensions. Thus, there is good internal coherence. The author also used a reliability coefficient, Cronbach's alpha (Cronbach 1951), to test the reliability of a scale. A value of 0.70 or greater is deemed to be indicative of good scale reliability (O'Leary-Kelly and Vokurka 1998). The Cronbach's alpha for the factors range from 0.68 to 0.89, suggesting that they are all reliable. As expected, the principles of the ISO 9001 standard are well reproduced except for two principles: continual improvement and factual approach to decision making, which load on one factor. The questions relating to these dimensions are presented one after the other in the questionnaire, so one can assume that the respondents gather them together and answer these four questions as a whole. Therefore, it is possible that they consider that making decisions based on some data, information, and facts contributes to the performance of the company and its continual improvement. Respondents may also consider that continual improvement and performance are tied to the factual decisions made by companies.

RESULTS

To test the hypotheses, ANOVA was carried out using the SPSS software program. Generally, one-way ANOVA is used to test the null hypothesis that multiple population means are all equal. In this study, it makes it possible to explore the differences within employee perceptions concerning ISO 9001 and the degree of employee knowledge about that certification. The F-value was tested to determine whether to accept or reject the null hypothesis ("the mean scores of perceptions of managers, technicians, and the working class are equal"). So, this test is appropriate for this study because it tests simultaneously for differences in the means of the different categories of employees.

The first ANOVA concerns the degree of employee knowledge about ISO 9001 certifications. It enables one to know whether some differences exist between employees and, if need be, what those differences are. The independent variable in this hypothesis is employee category (i.e., managers, technicians, and workers) and the dependent variables are the degrees of knowledge. The F-ratio with a value of 33.082 and a probability of ($p = 0.00$) indicates that the result is statistically significant at the 5 percent level. The results therefore support hypothesis 1, which posits that the degree of knowledge about ISO 9001 certification differs according to employee category. Table 1 shows the main results: the degree of knowledge is more important for managers with an average equal to 5.60, whereas it is lower for the others, with a value of 4.84 for technicians and 3.88 for workers. The confidence intervals are totally separated, showing a graduation in the degree of knowledge from managers to workers.

ANOVA was also used to explore the differences in perceptions of all employees about principles of the ISO 9001 standard. In the second hypothesis, the dependent variables are the constructs of quality management practices. Therefore, seven factors pertaining to the ISO 9001 standard that were identified earlier in the factor analysis formed the basis for the constructs of the dependent variables. The author tests the hypothesis as a whole with perceptions of all principles gathered together. Then, each principle is analyzed separately. The first result is presented in the Table 2. One can see

Table 1 Averages and confidence intervals of the degree of knowledge for each employee category

Categories	Means of the degree of knowledge	Confidence intervals	F
Managers	5.6042	[5.3522 – 5.8562]	33.082 p = 0.000
Technicians	4.8378	[4.5013 – 5.1744]	
Workers	3.8841	[3.5609 – 4.2072]	

Table 2 Averages and confidence intervals of the employee perception of ISO 9001

Categories	Means of employee perception of the ISO 9001 standard	Confidence intervals	F
Managers	5.5104	[5.3245 – 5.6963]	10.268 p = 0.000
Technicians	5.4730	[5.3093 – 5.6367]	
Workers	4.8986	[4.6311 – 5.1660]	

that the global perception of the ISO 9001 standard differs according to employee category. Perception decreases from managers with an average of 5.51 to technicians (5.47) and finally to workers (4.90).

The results for each significant principle that is analyzed independently follow the same trend. The differences can be explained by a better perception by managers than by other employees. It is the case for the principles of customer focus, involvement of people, system approach to management, and mutually beneficial supplier relationship presented in Table 3. The other principles of leadership, process approach, and continual improvement/factual approach to decision making are not significant, meaning that there is no significant difference of perception between employees. In all, considering these global and specific results, one can conclude that hypothesis 2 cannot be rejected because four principles out of seven presented suitable results.

The last hypothesis is connected to the other two. The differences of perception among employees concerning the degree of knowledge and the benefits obtained by companies from the ISO 9001

Table 3 Averages of the significant principles

	Customer focus	Involvement of people	System approach to management	Mutually beneficial supplier relationship
Managers	6.3125	5.4375	6.0208	5.4583
Technicians	5.9595	5.2027	5.8514	5.5270
Workers	5.2754	4.4638	5.1014	4.8851
F and probability	13.191 p = 0.00	12.077 p = 0.000	15.101 p = 0.000	6.373 p = 0.002

Table 4 Averages and confidence intervals of employee perception of ISO 9001 and their degree of knowledge about the certification

Employees' degree of knowledge	Employee perception of the certification	Number of respondents	F
1	5.0000	2	7.218 p = 0.000
2	4.2500	16	
3	5.0938	32	
4	5.1500	40	
5	5.3509	57	
6	5.5091	55	
7	5.8649	37	

standard are known. However, there is no information about the relations existing between these variables. So, one can postulate that the degree of knowledge about the certification positively influences the perception of the benefits derived from the standard. The results presented in Table 4 confirm this hypothesis, as the F-ratio is equal to 7.218 with a probability p = 0.000. From the averages and the confidence intervals one can conclude that the greater the degree of knowledge, the better the employee's perception of the ISO 9001 standard. There is one exception: When the degree of knowledge is equal to 1, the perception average is high (5.000). However, this result is marginal because it concerns only two respondents.

The results presented in this study are interesting for companies because they enable them to know what the position of each category of employees is concerning the implementation of the ISO 9001 standard. The next section will discuss these results.

DISCUSSION

Two main results of this study may be useful for companies. The first concerns the degree of knowledge about the ISO 9001 standard for each employee category. It decreases from managers to technicians and finally to workers. This result is a warning signal for firms because the lack of employee involvement at the shop-floor level has been identified as a major reason for the non-sustainability of the quality management system in an organization (Welikala and Sohal 2008). Different explanations can be put forward. In companies, according to their workstation, each category of employees is involved differently in the implementation of the standard. Therefore, managers who make decisions supervise and control the quality system must master those norms. For technicians, knowing the certification is also important because they participate in its implementation, but their degree of knowledge is less essential than for managers because they are under their authority and can benefit from their support if necessary. For workers who usually execute tasks and do not make strategic decisions, the degree of knowledge remains low. In practice, because of that hierarchy, companies display a difference of treatment of their employees. For example, the training schedule is adapted to each employee according to his or her status. Yet, the standard requires coordination of tasks and employees. So, all employees must know and understand the process of quality in order to accept and adhere to the company policy. This is all the more justified since this study shows that the greater the degree of knowledge, the better the employees' perception of the ISO 9001 standard. Thus, one can conclude that it is very important for companies to communicate, explain, and secure the endorsement of all employees, not just managers. To do so, a solution would be to improve the relationship among all parties, perhaps through an improved status of the quality

representative position over employees (Zelnik et al. 2012). Its function would consist in improving communication among top management and employees.

The second result concerns the differences in perception of the eight principles. Four principles are perceived differently according to employee category: customer focus, mutually beneficial supplier relationship, involvement of people, and system approach to management. The first two principles concern relations between the company and external stakeholders. For companies, it is most important to understand the interests of these partners, which implies some specific actions. Usually for companies, customer orientation leads to establishing a process of communication with them, a prospective analysis of their needs, and a regular assessment of their satisfaction and processing of their claims. Although a number of these actions could be carried out by all employees, e.g., an improved communication strategy to determine requirements and obtain feedback, other actions require specific skills and are reserved for a certain category of employees. That situation could explain the differences of perception between managers, technicians, and workers concerning this principle.

For suppliers, the interpretation could be identical: Actions for companies consist of defining some obligations on the part of suppliers, and in regularly assessing their performance, which requires some expert employees to do it. In these cases, if companies want to improve the perception of all employees, there are two possibilities: 1) when possible, integrate employees in a global process where all employees become one essential "link in the chain," or 2) be totally transparent about the actions implemented by their colleagues with external partners.

The results show that the principle of "involvement" is also perceived differently by employees, which is a serious problem, as the performance and employee endorsement of company goals depend on their degree of involvement. So, some important actions for companies would be to promote the value of each task and each employee, and empower the latter in the exercise of their duties such as suggested by the ISO 9001 certification.

The system approach to management principle is best perceived by managers, then by technicians, and ultimately by workers, meaning that for some employees, the interdependence of tasks implied by this principle and the benefits deriving from it do not appear clearly. Consequently, some information campaigns and some actions to promote collaborative work are necessary.

Concerning the other three principles of leadership, continual improvement/factual approach to decision making, and process approach, the results are dissimilar because there is no significant difference of perception between the categories of employees. This situation can be explained by the consequences associated with these principles in the ISO 9001 certification. The guidelines for the leadership principle are to create and maintain an internal environment in which people can become fully involved in achieving the company's objectives. In the field, this principle could be embodied, e.g., by resources that companies place at the employees' disposal to achieve their goals, such as training, means of production, environmental conditions concerning noise and temperature, and so on, which are generally concrete elements that are easier to assess. So, this could explain the similarity of perceptions among employees, as these perceptions would be more precise. The second principle based on a factual approach confirms the previous explanation. Indeed, the subjectivity of employees that explains their differences of perception is minimized by the consideration of objective criteria based on facts. The last principle of process approach, which posits that a desired result is achieved more efficiently when activities and related resources are managed as a process (Afnor 2008), is similarly perceived by the three categories of employees. The author thinks that employees assessed that principle in relation to their own activities and not at the company level, which favors accurate opinions, closer to reality, as they testified about something they experienced daily and not something they heard or learned second hand.

CONCLUSION

In this study, the author has suggested a way of knowing what the position of employees is concerning the contribution of the ISO 9001 certification. The main results are the following:

- The global perception of the contribution of ISO 9001 certification varies significantly among employees. Its positive perception decreases from managers to technicians and finally to workers. The degree of knowledge about the certification is correlated with the global level of perception: The higher the degree of knowledge, the better the perception.
- The analysis of each principle shows that four principles out of seven are assessed differently by the categories of employees. One possible explanation is that employees are likely to give more accurate opinions about certification when they have concrete elements to help them. Indeed, when the principle is evaluated from concrete points that concern the employees directly, their perceptions are observed to be closer to reality. On the contrary, when the principle is assessed globally at the company level, perceptions differ among employees, with those who are more informed having a better perception.

These results are interesting for companies because they enable them to detect the principles likely to generate some distortions, limiting the positive perceptions of the ISO 9001 certification. These results also confirm that greater knowledge of certification by all employees is fundamental in order that they all contribute to the company goals. In sum, this study provides a possible answer to the following questions:

- "Who?" Should managers, technicians, or workers be targeted?
- "Why?" Because it is very important that all principles are understood and accepted by employees, which is not always the case.
- "How?" This is answered by targeting exactly the principles that are problematic.

The responses to these questions enable companies to put appropriate actions in place for the successful implementation of ISO 9001 certification. For example, according to the author's results, the approach system dimension is perceived differently by employees with a poorer perception for the workers. From this situation, a practitioner will know what dimension raises a problem for his or her employees, what category of employees is affected, and why that dimension poses a problem. In this case, it is because of one category of employees: The workers have a bad perception of it, unlike their colleagues. Consequently, some corrective actions may be taken to encourage an "approach system" in managing different activities like an ordered set (a system). The establishment of a computerized information processing system would be a good example of a tool to improve the collaborative work and share information between all employees.

Finally, although the results found in this article are interesting, they show some limitations, which could be overcome in future analyses:

- The tool used to measure perceptions has been created for the needs of this study because no scale exists to measure the perception of the eight principles. In this case, the results are significant, but certain items present some problems with the test for normality. So, it would be necessary to gather more data about the degree of knowledge of the standards in each group of employees to test them again and confirm their relevance. Another important investigation concerns the degree of knowledge about ISO 9001, which could change the perceptions of one group differently from another group. If so, it would be important to know the reasons. It is likely that a specific training program for each category of employees will be a possible solution, because in quality management, it has been shown that training is a good lever of action. Indeed, the research revealed that training increases skill sets, motivation, higher productivity, and knowledge transfer of the employees (Oosterbeek 1998; Pate and Martin 2000). Also, training positively impacts employee productivity, which results in higher levels of employee satisfaction (Choo and Bowley 2007; Chang, Chiu, and Chen 2010).
- A second limit is that one consider that the good perception of managers due to greater knowledge of the certification is close to reality but the opposite could occur. So, it is essential to compare these perceptions with the objective data available about companies to have more precise information.
- In the end, one can expect that other important variables could provide interesting criteria to explain the differences of perceptions between

managers, technicians, and workers. Variables that could concern the company include: size (Brown, Van der Wiele, and Loughton 1998), sector (Quazi, Chang, and Chan 2002), and consumer behavior such as involvement, motivation, or supportive of company culture.

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BIOGRAPHY

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APPENDIX 1—Exploratory factor analysis results

The questions asked for each principle	Loading	Eigen-value	Cumulative percent of variation
Factor 1: Leadership			
Do you think the company takes the necessary action for you to get involved?	0.577	3.179	16.733
Do you think the company provides you with sufficient resources and training to achieve its objectives?	0.694		
Do you think the company places the infrastructures (e.g., material resources) at your disposal that you need to achieve its objectives?	0.826		
Do you think the company creates the environmental conditions you need (e.g., noise reduction) to achieve its objectives	0.790		
Factor 2: Continual improvement and factual approach			
Do you think the company is seeking to continually improve its overall performance?	0.689	2.854	31.752
Do you think continual improvement is a constant goal of the company?	0.801		
Do you think the company's decisions are based on facts?	0.720		
Do you think the company analyzes data and information to make a decision?	0.718		
Factor 3: Supplier relationship			
Do you think the suppliers and the company are dependent on each other?	0.796	2.346	44.098
Do you think the company and its suppliers have mutually beneficial relationships?	0.818		
Do you think the beneficial relationships between the company and its suppliers permit to create more value?	0.816		
Factor 4: Customer relationship			
Do you think the company meets customer requirements?	0.807	1.719	53.145
Do you think the company strives to anticipate customer expectations?	0.665		
Factor 5: System approach			
Do you think that managing different activities like an ordered set (a system) allows a company to be more effective in pursuing its objectives?	0.812	1.700	62.093
Do you think that managing different activities like an ordered whole (a system) allows a company to achieve its objectives at a lower cost?	0.858		
Factor 6: Involvement			
Do you think you are considered as an essential resource for your company?	0.660	1.664	70.851
Do you think full involvement in your company would allow you to use your skills?	0.733		
Factor 7: Process approach			
Do you know the other activities of the company that are linked with yours?	0.836	1.582	79.175
Do you think that better coordination within its activities is favorable for the company?	0.828		

APPENDIX 2 – Descriptive statistical table of the items

Dimension	Variables	Minimum	Maximum	Mean	Standard deviation	Skewness	Kurtosis
Customer focus	VAR 1	1.00	7.00	5.4532	1.0204	–0.860	1.458
	VAR 2	1.00	7.00	5.3103	1.3077	–0.753	0.438
Leadership	VAR 3	1.00	7.00	4.9951	1.3841	–0.557	–0.148
	VAR 4	1.00	7.00	4.8966	1.4226	–0.587	0.039
	VAR 5	1.00	7.00	5.0443	1.4047	–0.566	0.012
	VAR 6	1.00	7.00	5.1429	1.4227	–0.640	–0.016
Involvement	VAR 7	1.00	7.00	4.5665	1.6135	–0.371	–0.697
	VAR 8	1.00	7.00	5.4433	1.2509	–1.165	1.787
Process approach	VAR 9	1.00	7.00	5.7586	1.5208	–1.563	2.169
	VAR 10	1.00	7.00	5.8768	1.4176	–1.823	3.477
System approach	VAR 11	1.00	7.00	5.8522	1.1806	–1.369	2.799
	VAR 12	1.00	7.00	5.4631	1.2398	–0.765	0.670
Continual improvement – factual approach	VAR 13	1.00	7.00	5.5419	1.3283	–0.993	0.749
	VAR 14	1.00	7.00	5.4877	1.3139	–1.038	1.004
	VAR 15	1.00	7.00	4.9951	1.4742	–0.684	–0.067
	VAR 16	1.00	7.00	5.0690	1.4843	–0.789	0.270
Supplier relationship	VAR 17	1.00	7.00	5.5172	1.3872	–1.042	1.196
	VAR 18	1.00	7.00	5.0640	1.3933	–0.570	0.097
	VAR 19	1.00	7.00	5.6305	1.3484	–1.015	0.958

APPENDIX 3—Reliability analysis: Inter-item correlation matrix and Cronbach's alpha coefficients

Items	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19
V1	1																		
V2	**0.6361**	1																	
V3	0.4433	0.5916	1																
V4	0.5201	0.5815	**0.6785**	1															
V5	0.4798	0.5126	**0.6112**	**0.7306**	1														
V6	0.4019	0.4843	**0.6062**	**0.6408**	**0.6855**	1													
V7	0.4086	0.4653	0.5510	0.4980	0.5327	0.5426	1												
V8	0.4275	0.4239	0.5645	0.4793	0.4339	0.4399	**0.5544**	1											
V9	0.1028	0.0229	0.1194	0.0548	0.0838	0.1281	0.1972	0.2257	1										
V10	0.2989	0.1489	0.2091	0.1753	0.2588	0.2739	0.2168	0.2710	**0.5212**	1									
V11	0.2613	0.2030	0.1541	0.1942	0.1472	0.1924	0.2651	0.3630	0.3137	0.3352	1								
V12	0.1503	0.1644	0.1975	0.2069	0.2013	0.2430	0.2766	0.3586	0.2775	0.3002	**0.6558**	1							
V13	0.5448	0.5582	0.5211	0.5773	0.4593	0.4382	0.4382	0.4357	0.1999	0.3169	0.3354	0.2677	1						
V14	0.4990	0.4762	0.4777	0.5568	0.4844	0.4287	0.4272	0.5033	0.1806	0.2636	0.3626	0.2922	**0.7640**	1					
V15	0.4425	0.5067	0.5726	0.6182	0.6025	0.5220	0.5215	0.4361	0.1342	0.2082	0.1873	0.2369	**0.5854**	**0.6607**	1				
V16	0.4728	0.5245	0.6074	0.6294	0.5897	0.5579	0.4797	0.5354	0.1741	0.2158	0.2657	0.2812	**0.6012**	**0.6630**	**0.7897**	1			
V17	0.2323	0.2495	0.1999	0.1602	0.1025	0.1681	0.1250	0.2267	0.2895	0.2465	0.4641	0.3321	0.3549	0.3227	0.2361	0.3048	1		
V18	0.3416	0.3450	0.3313	0.3530	0.3198	0.2801	0.1820	0.2535	0.1335	0.1945	0.3248	0.3352	0.3824	0.3209	0.3665	0.3473	**0.6052**	1	
V19	0.2374	0.2141	0.3147	0.2200	0.2335	0.2263	0.1854	0.2473	0.2605	0.2791	0.4289	0.3723	0.3030	0.2810	0.2506	0.2156	**0.5870**	**0.6239**	1

V1 to V2: Customer focus dimension – Cronbach's alpha coefficient = **0.7631**
V3 to V6: Leadership dimension – Cronbach's alpha coefficient = **0.8854**
V7 to V8: Involvement dimension – Cronbach's alpha coefficient = **0.6987**
V9 to V10: Process approach dimension – Cronbach's alpha coefficient = **0.68**
V11 to V12: System approach dimension – Cronbach's alpha coefficient = **0.7915**
V13 to V16: Continual improvement – Factual approach dimension – Cronbach's alpha coefficient = **0.8926**
V17 to V19: Supplier relationship dimension – Cronbach's alpha coefficient = **0.8214**