

# The impact of environmental characteristics on TQM principles and organizational performance

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## Abstract

One recurrent theme within the literature on total quality management (TQM) is the study of its effect on organizational performance. Nonetheless, most research has focused on analyzing the relationships between the implementation of different elements and several types of performance. This paper incorporates the effect of organizational environment as a variable for explaining the impact of TQM on business results. The model is tested using structural equations, employing a survey of quality managers in 273 Spanish firms. The causal analysis results show that dynamism, munificence and complexity influence the degree of implementation of the main TQM principles. The most relevant effects emerge as a result of the environmental dynamism, and the least effects are due to munificence. Similarly, the dimensions of TQM have an impact on different types of performance. The model can be used by organizations to assess their level of TQM success depending on specific environmental characteristics.

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## 1. Introduction

One of the keys to the popularization of total quality management (TQM) is that it is deemed to be a historically unique approach to improve organizational effectiveness [1]. In fact, many studies have highlighted the benefits that may be obtained through its proper implementation [2–4]. Nonetheless, the introduction of TQM has produced uneven results and in numerous cases it has been a failure [5–10].

The relationship between performance and TQM has been analyzed according to the degree of implementation of its elements (leadership, quality-oriented culture, reward system, employee participation, etc.). So, for example, the studies by Chapman et al. [11], Easton and Jarrell [12], Kaynak [13] and Powell [14] evaluate performance using financial

indicators, and other studies (e.g., [15–27]) also evaluate aspects such as customer satisfaction, employee satisfaction or the quality of the products and services offered.

However, till recently, few works have considered how the existence of factors external to the implementation of TQM might affect performance (e.g., [14,28–32]). Shin et al. [33] suggest that one of the factors for the TQM success is its fit with firms' strategic priorities, the competitive environment and the organization's goals. A firm that definitely intends to implement TQM as a fundamental strategy for its activities should not forget that it is part of an environment that has certain characteristics that might favor or be detrimental to achieve its targets. Assuming that proper implementation is essential for obtaining profits, the variability of the latter in firms that have introduced TQM might be justified by its interaction with the environment.

Since organizations are conceived as open systems, different disciplines have pointed out mechanisms for connecting the organizational environment and its performance. In fact, in the organizational literature the research papers dealing with the environmental effects on structure and strategy are

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now acknowledged to be classic (e.g., [34–38]). The environment–organization interface is a matter that is now so widely accepted that it leads us to suggest that the differences in the results achieved by firms that have implemented TQM will also be conditioned by the environment. Especially so when the studies published to date have not always been able to demonstrate that TQM may explain a large proportion of the variations in organizational performance.

Over the last few years, it has been seen that a firm's survival depends to a great extent on the capacity to constantly satisfy the customers' needs and to overcome competitive pressures. Hill and Wilkinson [39, p. 12] suggest that TQM "is contingent with different versions or manifestations in different sectors under different market conditions in organizations of different sizes and at different stages of quality development".

Therefore, the overall understanding of the factors that determine the successful implementation of TQM is a really complex issue that can only be achieved by integrating several research topics that analyze human, managerial, technical and contextual aspects. The study of TQM effectiveness cannot be performed by only considering a single perspective since a firm's success does not depend on just one single factor [40,41]. The contribution of this paper focuses on this approach.

Hence, with the aim of studying in depth the factors that mediate the effectiveness of TQM programs, this paper suggests the possible influence that the environmental characteristics or dimensions might have on its implementation and on its performance. Specifically, the main purpose of this research is to determine whether the relevant dimensions of the specific environment such as dynamism, munificence and complexity, are the forerunners of the main strategic

TQM dimensions and its performance. This leads us to analyze whether such environmental characteristics will have a positive or negative influence on TQM.

## 2. Literature review

A significant number of articles in the literature on organizational environment have studied its dimensions focusing on different conceptions (e.g., [42–45]). These environmental characteristics have allowed authors to specify how the environment affects different structural and strategic aspects and performance. This is the case of the papers by Boyd [46], Dess and Beard [47], Keats and Hitt [36], Miller and Friesen [37], Papadakis et al. [48], or Sutcliffe and Huber [49].

Equally, this work proposes a model for explaining the results of TQM by considering the effects of several environmental attributes on the main TQM dimensions (Fig. 1). This model intends to provide empirical evidence for the restrictions that the environment exerts on TQM and on the effects of the latter on organizational effectiveness. In particular, the model considers the following elements: (a) the most significant dimensions of the environment, (b) the main TQM principles, and (3) organizational performance.

The exogenous variables of the model are three dimensions of the environment: dynamism, munificence and complexity. These attributes represent the main characteristics of the environment considering the resource dependence and organizational population ecology theories [47]. Furthermore, they have frequently appeared in the literature for analyzing the effects of the environment on organizations and their performance (see, for example [36,46,49–51]).

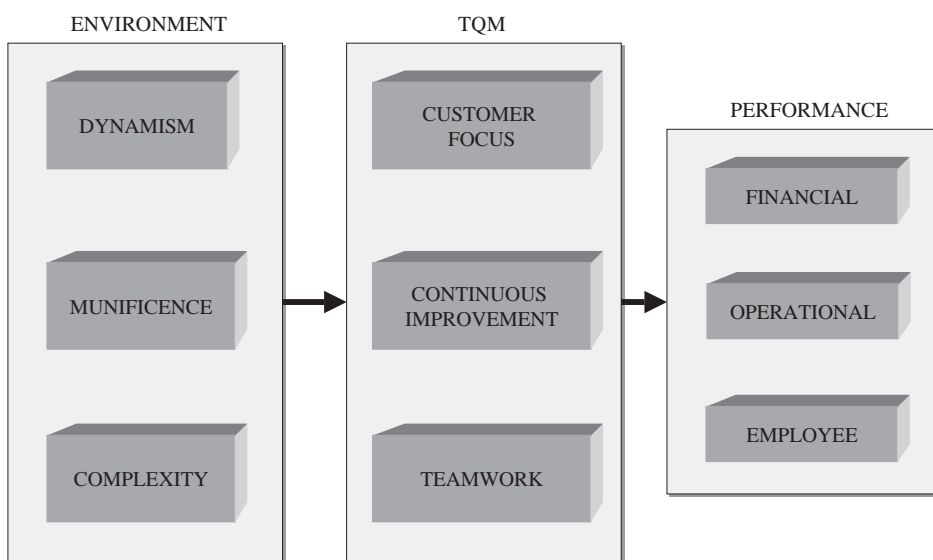


Fig. 1. The conceptual model of environment, TQM and organizational performance.

Despite organizational environment is a fundamental concept in management theory, there is little consensus regarding its conceptualization and measurement. Environment can be thought in terms of the elements that influence the organization. For instance, Dill [52] made the distinction between general and task environments (customers, suppliers, competitors and regulatory groups). A second approach is to analyze the environmental characteristics. This view is useful to test its relationship to organizational structures, processes, technologies and outcomes. Many authors have identified several environmental dimensions [35,41,42,45], but three constructs are common to most environmental research: dynamism, munificence and complexity. Dynamism or instability reflects the rate of environmental change. Turbulence or volatility are similar terms to dynamism, and are related to the degree of novelty in the changes or to their speed (e.g., [53]). According to the information uncertainty perspective, increasing levels of environmental dynamism will lead to greater environmental uncertainty, a concept that includes the degree of predictability concerning the changes and their effects on the organization (e.g., [43,54]). Munificence is generally seen as the extent to which an environment can provide sufficient resources for the firms operating in it. For the construct to be complete, competition should be included [55]. A market that has little growth may be extremely munificent if it contains few competitors. On the contrary, a rapidly growing market may have little capacity for a given firm if there are many competitors. The opposite to environmental munificence is environmental hostility. For example, Mintzberg [45] discussed this construct in terms of both availability of resources and competition for resources. Complexity reflects the level of complex knowledge that the environment required to be understood. Many authors consider that heterogeneity is similar to complexity. Heterogeneity describes whether the elements in the environment are similar to or different from one another [41].

A controversial issue in the literature is the objective or perceptual nature of environment. Weick [56] suggests that the important organizational environments are those which are enacted or created through a process of attention. Therefore, the organization responds only to what it perceives. However, Bourgeois [34] suggest that the distinction between perceived and objective environment is relevant. This author affirms that environment perception is an element distinct from the objective task environment and it is a prime input to secondary strategy making (competitive approach). From an operational viewpoint, objective environmental measures include indicators such as growth in industry sales and concentration ratios. Perceptual measures entail the subjective judgements of the environment by organization members or key informants [57].

The first endogenous variables in the model are three dimensions of TQM: customer focus, continuous improvement and teamwork. Although TQM covers much more than these three aspects, the selection is based on two arguments.

First, they are a reflection of the basic TQM principles and the literature has widely accepted the fact that they represent the main characteristics for differentiating TQM from the contents of other management systems [58,59]. One problem in reaching consensus on TQM content is the broad range of dimensions included by several authors. Saraph et al. [60] presented the first set of empirically validated integrated quality management elements. More recently, Ahire et al. [61], Flynn et al. [21], Grandzol and Gershon [62] or Rao et al. [63] developed a more comprehensive set of TQM implementation constructs with a rigorous statistical validation process. From a theoretical perspective, Dean and Bowen [58] present an overview of TQM that captures its most important features. These authors conceived the TQM “as a philosophy or an approach to management that can be characterized by its principles practices and techniques. Its three principles are customer focus, continuous improvement, and teamwork, and most of what has been written about TQM is explicitly or implicitly based on these principles” [58, p. 395]. Customer focus reflects the major goal of quality management, i.e., to meet or exceed customer expectation. Customer focus must be reflected in the overall planning and execution of quality efforts. Continuous improvement means a commitment to constant examination of technical and administrative processes in search of better methods [58]. This philosophy recognizes that performance must always be improved because the competition never rests. Teamwork encourages the collaboration among different individuals or groups (suppliers and customers included). Quality circles or quality improvement teams are effective ways to point out employees that they are important. Moreover, teamwork is a method to achieve employee involvement and participation.

Secondly, previous studies have used these dimensions. Morrow [64] relates these three principles to different outcomes such as employee satisfaction, communications or perceptions about the work environment. Gatewood and Riordan [65] take this into account for studying the relationship between TQM, certain organizational practices, employee attitudes and customer satisfaction.

Organizational performance appears as a second-order endogenous variable in the model, understood in the terms used by Venkatraman and Ramanujam [66] and which means the consideration of performance in a wide sense. According to these authors the performance domain has three levels: financial, financial and operational, and organizational effectiveness. Business performance is referred to the use of indicators that reflect economic goals of the firm as profitability, return of investment, or earnings per share. A broader conceptualization of business performance would include indicators of operational performance that focuses on key operational factors such as technological efficiency, product quality, new product introduction, or market-share. Finally, organizational effectiveness include others organizational goals and the influence of multiples constituencies or stakeholders.

### 3. Hypotheses

#### 3.1. Environmental dimensions and TQM principles

From an operative perspective, a dynamic environment is shown through changes in customer tastes, production or service technologies and in the ways for competition in the firm's principal industries [37,67]. If the environment is dynamic, firms will need to adapt faster to customer needs. In turbulent environments the success of firms depends more on their adaptation to change and customer needs. Miller [68] suggests that a dynamic and unpredictable environment requires that managers have a good understanding of customer preferences and competitor products in order to offer products that will increase customer loyalty. On the contrary, when the environment is stable, with a fixed set of consumers with stable preferences, few adjustments to a marketing mix are necessary to cater to these customers, hence a low level of market orientation is required [69].

Furthermore, the more the dynamism in an environment increases, the greater continuous improvement will be. Customer needs, competitor activities and the innovations for products and services in the sector change faster and demand a more immediate adaptation. Incremental improvements as against radical ones will allow this greater flexibility. Furthermore, as Lawrence and Lorsch [70] suggest, in dynamic environments firms demand a more innovative products, services and processes. This will lead firms to continually seek new methods and mechanisms for improving the products and services that they offer to the market.

On the other hand, according to Kaufman [71], when environments change quickly, perception and adaptation by managers may be insufficient. The employees, through work groups, may achieve greater flexibility in order to adapt to the environment, given that those who are most familiar with the work are those who have the authority and responsibility, not simply for perceiving but rather for implementing changes. This really amounts to admitting that if TQM does not involve a true empowerment, the mechanistic efficiency of TQM may create stability in the work system at the cost of being unable to respond to environmental fluctuation [72]. When the environment is dynamic, employee participation through teamwork allows firms to adapt more readily to changes. Hence,

H1: Environmental dynamism has a positive effect on customer focus.

H2: Environmental dynamism has a positive effect on continuous improvement.

H3: Environmental dynamism has a positive effect on teamwork.

Munificence may be understood as the degree to which the environment can support growth. Munificent environments impose fewer restrictions on organizations than those environments with scarce resources [73]. The degree of competition may also reflect the munificence of the environment

[55]. In environments where resources are scarce, rivalry between firms is greater [74,75].

Lusch and Laczniak [76] suggest that organizations with more competitive environments may be influenced by a greater response to the changes in market needs, and therefore, they will be more market-oriented. If there is little competition, customers will have less chance of changing firms, then customer orientation will be less necessary. On the other hand, under conditions of high competition, consumers will have many alternative options to satisfy their needs and demands [77].

As Yasai-Ardekani [75] suggests, in munificent environments there will be a tendency to delegate authority in decision-making to lower organizational units that more closely interface with an organization's environment. Such delegation enables employees to provide on-time responses that remove constraints or that deal more effectively with competitive pressures. The cooperation within TQM means the employees' participation through different teamwork. Hence,

H4: Environmental munificence has a negative effect on customer focus.

H5: Environmental munificence has a positive effect on teamwork.

According to Lawrence and Lorsch [70] complex environments require a high level of internal differentiation. Firms use the resources to train, hire and develop specialists who will manage the interdependencies in their environment. Therefore, they are left with few resources to invest in external promotions that will increase the sales or the market share. On the contrary, low levels of complexity allow them to have free resources that might be needed in the processing of information or for growth. This is really just admitting that when the environment is characterized by a diversity of production methods, mechanisms for competition or customers preferences, the firm earmarks its efforts towards the inside of the firm in order to be able to react to variety.

Moreover, the complexity of the environment reflects the heterogeneity in the range of the firm's activities [43]. Miller and Friesen [37] demonstrated that there is a positive relationship between the heterogeneity of the environment and the strategy for innovation. This involves the introduction of new products and technologies as well as the search for new solutions for production and market problems. The more heterogeneity involved, the greater the pressures will be to obtain improvements that may allow a more suitable adaptation to diversity. Furthermore, when heterogeneity is low, a firm may stick to the same product line, manufacturing process and market practices year after year. The function of operations is automatic and the changes are hardly significant.

If heterogeneity is greater, firms must face up to a greater variety of products, markets and demands from the customers. This means that the tasks to be performed will be more complex and less routine, since the firm must generate different subsystems to satisfy the different environments. In

these cases, less formalized and more flexible structures are needed, as well as greater delegation of power to the lower levels [78]. When there is a lack of strong centralized control, this means the utilization of interdisciplinary teams and other mechanisms for coordinating actions [55,79]. Hence,

H6: Environmental complexity has a negative effect on customer focus.

H7: Environmental complexity has a positive effect on continuous improvement.

H8: Environmental complexity has a positive effect on teamwork.

### 3.2. *Interrelations of the TQM elements*

According to the continuous improvement definition by Turney and Anderson [80, p. 38] as “the relentless pursuit of improvement in the delivery of value to the customer”, we may establish that it is an essential factor in attaining customer focus. Dean and Bowen [58, p. 396] state that consistent customer satisfaction “can be attained only through the relentless improvement of processes that create products and services”.

Groups of autonomous employees having the commitment and power necessary to assure long-term success can apply TQM methods at the team level in order to reduce undesirable variance in work processes [72]. With TQM, working groups have a formal mechanism for measuring and controlling the efficiency of the technical systems and coordination is achieved for the efforts of the teams in work functions. The continuous improvement achieved is more stable when the teams’ efforts concentrate on common targets that align the organization.

As Turney and Anderson [80] state, success in a continuous improvement environment requires that employees work as a team. Choi and Liker [81] consider that continuous improvement depends on the energy and the commitment of the people on all levels and across functions. The success of continuous improvement requires involvement of employees in the processes improvement [82–85].

Empowerment encourages customer orientation because the employees who contact the customers are more flexible and respond better in order to satisfy their needs [18]. Empowerment allows the management to take advantage of its employees’ skills thanks to greater access to information and resources and the delegation of decision-making [61,86]. Hence,

H9: Continuous improvement has a positive effect on customer focus.

H10: Teamwork has a positive effect on continuous improvement.

H11: Teamwork has a positive effect on customer focus.

### 3.3. *TQM and performance*

Pelham and Wilson [87] suggest that market orientation has a significant influence on new product development, rel-

ative product quality, growth/share, and profitability. Market orientation allows them to obtain more knowledge about their market environment and their customers’ key needs that provide them added value. Authors such as Reed, Lemak and Montgomery [32] justify how TQM’s market orientation is linked to the sources of performance improvement. Income can increase if satisfying customer needs helps both to retain and attract more customers. Likewise, costs can be reduced by using product design techniques that help to meet the demands of customers, eliminating unnecessary costs. Additionally, firms emphasizing activities that seek to understand customer needs and satisfy those needs should produce products with lower defect, which should in turn lead to reduced costs. Along the same line, Ahire and O’Shaughnessy [16], Dow et al. [19] or Zhang [27] show that customer orientation is a critical factor for achieving high product quality.

Equally, in customer oriented firms employees manifest a sense of pride in belonging to an organization in which all individuals and departments are targeted towards the common goal of serving customers [69]. Customer orientation forms part of the design work that emphasize the establishment of relationships with the customers and feedback mechanisms, which is associated with high levels of satisfaction at work and more favorable perceptions of the working environment [88]. Hence,

H12: Customer focus has a positive effect on financial performance.

H13: Customer focus has a positive effect on operational performance.

H14: Customer focus has a positive effect on employee performance.

Continuous improvement provides two important benefits. First, it creates value for the customer since it seeks to match his demands. Second, it is a mechanism for eliminating waste, so allowing costs to be cut. Greater profitability may be achieved with this mechanism by increasing profit margins [17]. Furthermore, the practices and techniques that help to achieve continuous improvement include processes analysis or the use of statistical process control [58]. Their application contributes toward a reduction in process variation and the percentage of defects.

The effects of continuous improvement on employee performance may be justified by various motivation theories. According to the goal-setting theory, goals will be motivating to people if they are specific and difficult, and people accept them as their own [89]. Given that continuous improvement involves a permanent process of setting new performance goals, its achievement may favor employee satisfaction. Moreover, from the job characteristics theory viewpoint by Hackman and Oldham [90] employees will feel more satisfied with their jobs and the absenteeism rate will be lower if their jobs possess certain core characteristics: skill variety, task identity (doing a meaningful unit of work), task significance, autonomy and feedback. The implementation of continuous improvement involves many of



the above mentioned aspects such as self-control, knowledge about the whole process and permanent information about the results achieved.

H15: Continuous improvement has a positive effect on financial performance.

H16: Continuous improvement has a positive effect on operational performance.

H17: Continuous improvement has a positive effect on employee performance.

As the organizations that have implemented TQM are generally more decentralized, they tend to provide more information to the employees and create working groups more involved in the organization [91]. This form of understanding work may mean greater satisfaction for the employees. Moreover, using teamwork in the problem-solving process provides a source of initiatives geared toward process improvement, with the objective of making these processes more efficient and more focussed on customer satisfaction. Ahire et al. [61] suggest that human resources management has an important role in achieving higher quality products. In their study, they found a high correlation between empowerment, training and the employee involvement with elements that contribute towards product quality such as product design or supplier quality management. Ahire and O'Shaughnessy [16] also demonstrate that employee empowerment is a statistically significant factor for explaining the high quality of the products.

On the other hand, teamwork is an important concept for attaining organizational goals [92]. Zeithaml et al. [93] suggest that teamwork is an important factor for providing service quality. In TQM, employee participation and cooperation among the departments are conceptual requirements for improving product quality, productivity and customers and employees' satisfaction [94]. Wagner [95] found a positive relationship between participation and performance and employee satisfaction.

H18: Teamwork has a positive effect on financial performance.

H19: Teamwork has a positive effect on operational performance.

H20: Teamwork has a positive effect on employee performance.

Finally, earlier studies have demonstrated that these three dimensions of performance are related. For example, Jacobsen [96] and Venkatraman and Prescott [97] demonstrated a positive relationship between product quality and profitability. Equally, studies such as Anderson et al. [98] link customer satisfaction to greater profitability. In the same way, Larson and Sinha [99] confirm a positive relationship between employee satisfaction and product quality. Turnow and Wiley [100] discovered significant correlations between employee satisfaction and various measurements of customer satisfaction. Moreover, employee satisfaction and lower absenteeism rates have effects on financial performance. If the employees remain at the firm longer, there will be less strikes and less disputes. According to Seashore

et al. [101] absenteeism and instability may be very costly and have a major financial impact. Hence,

H21: Operational performance has a positive effect on financial performance.

H22: Employee performance has a positive effect on financial performance.

H23: Employee performance has a positive effect on operational performance.

Fig. 2 shows the proposed hypotheses.

## 4. Methodology

### 4.1. Sample

The data used in this study were obtained from a survey performed on Spanish firms that operated in a competitive environment. When studying all types of sectors, the intention was to survey a larger number of competitive situations and features of the environment that would not be biased by the sectorial and economic features of a specific region.

A total of 1550 firms were selected taking as our reference the firms belonging to the Quality Management Club and those that had obtained a registration for their quality assurance system until September 1999 (over 7500 firms). A characteristic of the sample involves whether the firms were, in fact, involved in the deployment of TQM. To assess this variable, respondents were asked how long TQM had been in place.

The questionnaires were either mailed to the firms (465) or faxed (the rest). The mail included a stamped envelope for returning the questionnaire and had an identification system to register the firms that had answered with the aim of allowing us to contact those who had not yet answered again to remind them to return the questionnaire. All the questionnaires were addressed to the manager who had responsibility for TQM.

The mailing and reception of questionnaires took place gradually from September 1999 to February 2000. The final number of questionnaires received amounted to 286, with 273 being valid. From this number, 105 corresponded to mail returns (22.58% response rate) and 168 by fax (15.48% response rate). Table 1 shows the percent breakdown of the participating companies categorized by sector, number of employees and years of TQM implementation, and respondents by organizational position, length of service and quality training.

### 4.2. Measures

TQM dimensions were measured using the scales developed by Grandzol and Gershon [62] for customer orientation, continuous improvement and external/internal cooperation. These scales were modified as follow: (1) responses were seven-point Likert format (1 = strongly disagree;

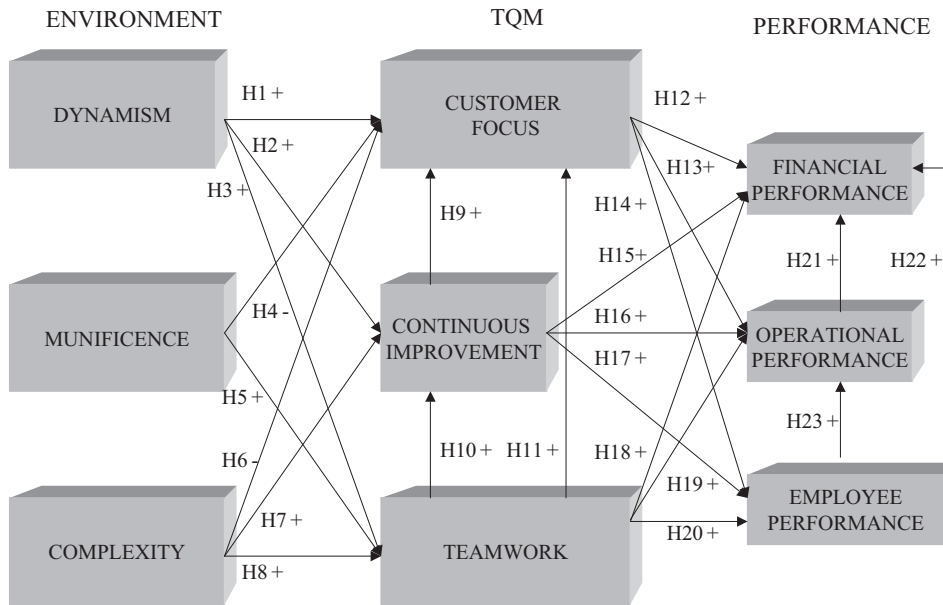


Fig. 2. The hypotheses of environment, TQM and organizational performance model.

Table 1  
Profile of participating companies and respondents

Sector	Percent
Industrial	68.9
Service	31.1
Number of employees	
Less than 25	22.3
> 26–50	21.6
> 51–250	29.5
> 251–500	8.0
> 501–1000	6.8
More than 1000	11.7
Years TQM implementation	
Less than 2	38.6
> 3–5	38.2
More than 5	23.2
Position of respondents	
General manager	16.1
Quality manager	78.4
Other manager	5.5
Length of service (years)	
Less than 3	13.9
> 3–10	45.1
More than 10	41.0
Quality training	
Primary	4.4
Intermediate	25.9
Advanced	45.9
Expert	24.0

7 = strongly agree); (2) the questionnaire was addressed exclusively to managers.

**Environmental dimensions.** Following the patterns from previous studies, a scale was taken into account for each one based on those developed earlier whilst introducing some modifications. In order to measure the dynamism, a 4 item scale was used that measures the degree of the change (1 = never changes; 7 = changes very often) in key elements of the market structure [43]: (1) processes and technology, (2) customers' tastes and needs; (3) products and services, and (4) competitive strategies and actions. This concept of dynamism, match that proposed by Dess and Beard [47]. We measured munificence with a five item scale based on those developed by Sutcliffe and Huber [49] and Miller and Friesen [37]. This scale includes three items that refer to the favorable situation of the environment and two that reflect the influence of competition within the sector. Sharfman and Dean [55] suggest that the competition within the industry must be included in the munificence construct. These two items reflect the opposite end to munificence (hostility) and they were reverse-scored. Finally, complexity is measured in the manner proposed by Miller [68] with four items in which the diversity or heterogeneity is assessed in production techniques or methods, market tactics, customer tastes and preferences and competitor actions. In the case of munificence and complexity, responses were seven-point Likert format (1 = strongly disagree; 7 = strongly agree). Respondents were asked to consider that each of items were rated over the past 5 years.

**Organizational performance** was measured with a scale of 10 items that includes different indicators for achieving

Table 2  
Results of confirmatory factor analysis of organizational environment

	Items	Standardized parameter	<i>t</i> -values	<i>R</i> <sup>2</sup>	Construct reliability	Variance extracted
Dynamism	D1	0.74	17.05	0.54	0.79	0.49
	D2	0.71	15.83	0.50		
	D3	0.74	16.07	0.54		
	D4	0.60	12.36	0.37		
Munificence	M1	0.79	19.51	0.63	0.89	0.80
	M2	0.99	26.76	0.98		
Complexity	C1	0.74	18.30	0.54	0.83	0.56
	C2	0.77	18.13	0.60		
	C3	0.73	14.64	0.53		
	C4	0.74	16.56	0.55		

Goodness of fit

$\chi^2 = 103.45$  ( $p = 0.00$ ),  $\chi^2/g\ 1 = 3.23$ , GFI = 0.95, RMSEA = 0.091, AGFI = 0.92

goals used in previous studies and which are backed by experts in TQM. The items reflect the improvement in customers and employees' satisfaction, the improvement in product and service quality, profitability and growth [14,15,17,23,62,98]. Following the organizational effectiveness model from Venkatraman and Ramanujam [66], we assigned them to three categories: financial performance, operational performance and employee performance. For each measure, a set of statements were assessed with a scale from 1 (extremely bad) through 7 (extremely good) in relation to the levels prior to the implementation of TQM. This type of subjective measuring allows a better comparison between different types of industries and situations. It also provides management's perception of the improvement of results due to adopting TQM. The items used in operationalizing each construct are described in the appendix.

In addition to this, in order to check the validity of the perceptions on some of these performance items, we have collected objective information from the Amadeus database. More specifically, we found details on the ROA and the profit before tax for 80% of the firms in the sample. For each firm, we calculated the difference in these three variable over the 5 previous years (between 1995 and 1999). Then, we also calculated the correlation of the difference in the ROA with the valuation for the item "profitability growth", of the difference in the profit before tax with the valuation for the item "growth in profits". In all two cases, the correlations are positive and significant at 0.05. These results help give a stronger justification to the use of these subjective ratings for measuring firm performance. In the case of other variables of operational performance and employee performance, it is more difficult to identify variables that can accommodate the items proposed and, therefore, we have been unable to obtain objective measures.

#### 4.3. Scales reliability and construct validity

In order to analyze the reliability and validity of the scales, the corresponding confirmatory factor analyses were run using the LISREL program. The main results of the validation process are showed in Tables 2–4. The first step in interpreting the results of confirmatory factor models is to assess the overall fit model. As indicated in Tables 2–4, most of the overall model fit indices are acceptable (GFI, AGFI, normed  $\chi^2$  and RMSEA), then the next step is to evaluate and interpret the estimated model parameters. In the final scales all of the indicators have significant positive weights ( $p < 0.05$ ) and factor loadings exceed the minimum threshold of 0.4 [102], significaying good construct validity of the latent variables proposed. The squared multiple correlation ( $R^2$ ) for each indicator gives the communality of the indicator and it can be used to assess how good or reliable a variable is for measuring the construct that it purports to measure. Although there are no hard and fast rules regarding how high the  $R^2$  should be, Sharma [103] suggests that it should be at least greater than 0.5. In the present case, most of the  $R^2$  exceeds this value. Finally, constructs reliabilities and extracted variances indicate an adequate internal consistency of the constructs. The reliabilities are fully acceptable, since exceed the 0.70 threshold, while the extracted variances (save dynamism) approach the 0.50 target value. Table 5 shows the correlation matrix between factors of study.

## 5. Results

A structural equations model was run using the LISREL 8.12 program in order to test the hypotheses. As a prior



Table 3  
Results of confirmatory factor analysis of TQM constructs

	Items	Standardized parameter	<i>t</i> -values	<i>R</i> <sup>2</sup>	Construct reliability	Variance extracted
Customer focus	CF1	0.79	23.51	0.62	0.85	0.66
	CF3	0.93	38.36	0.86		
	CF4	0.83	31.37	0.70		
Continuous improvement	CI1	0.92	29.93	0.84	0.86	0.68
	CI2	0.71	14.68	0.51		
	CI3	0.57	11.25	0.32		
Teamwork	T1	0.65	17.96	0.42	0.94	0.72
	T3	0.81	19.46	0.65		
	T4	0.85	29.20	0.72		
	T5	0.83	18.90	0.69		
	T6	0.73	15.84	0.53		
	T8	0.82	32.79	0.67		

Goodness of fit

$\chi^2 = 99.36$  ( $p = 0.000$ ),  $\chi^2/g\,l = 1.94$ , GFI = 0.97, RMSEA = 0.059, AGFI = 0.96

Table 4  
Results of confirmatory factor analysis of performance

	Items	Standardized parameter	<i>t</i> -values	<i>R</i> <sup>2</sup>	Construct reliability	Variance extracted
Financial	FP1	0.94	28.50	0.88	0.97	0.94
	FP2	1.00 <sup>a</sup>	36.14	1.00		
Operational	OP4	0.71	13.24	0.51	0.79	0.56
	OP5	0.78	9.90	0.60		
	OP6	0.76	15.95	0.57		
Employees	EP1	0.81	15.98	0.74	0.78	0.64
	EP2	0.65	12.91	0.53		

Goodness of fit

$\chi^2 = 20.27$  (0.062),  $\chi^2/g\,l = 1.69$ , GFI = 0.99, RMSEA = 0.057, AGFI = 0.99

<sup>a</sup>Error variance was fixed to 0.005.

Table 5  
Correlations matrix and summary statistics for the constructs

Factor	1	2	3	4	5	6	7	8	9	Mean	SD
1.Dynamism	1.00									3.92	1.14
2.Munificence	0.140**	1.00								4.46	1.41
3.Complexity	0.371*	0.162*	1.00							4.18	1.24
4.Customer focus	0.172*	0.062	0.168*	1.00						5.92	1.00
5.Continuous improvement	0.231*	0.175**	0.153**	0.549*	1.00					5.56	1.06
6.Teamwork	0.216*	0.102	0.181*	0.616*	0.670*	1.00				5.02	1.09
7.Financial performance	0.186*	0.340*	0.135**	0.216*	0.203*	0.192*	1.00			4.66	1.12
8. Operational performance	0.210*	0.052	0.089	0.366*	0.383*	0.431*	0.166*	1.00		5.31	0.91
9.Employee performance	0.146**	0.176*	0.287*	0.329*	0.404*	0.531*	0.274*	0.511*	1.00	4.61	1.03

\*  $p < 0.01$ .

\*\*  $p < 0.05$ .

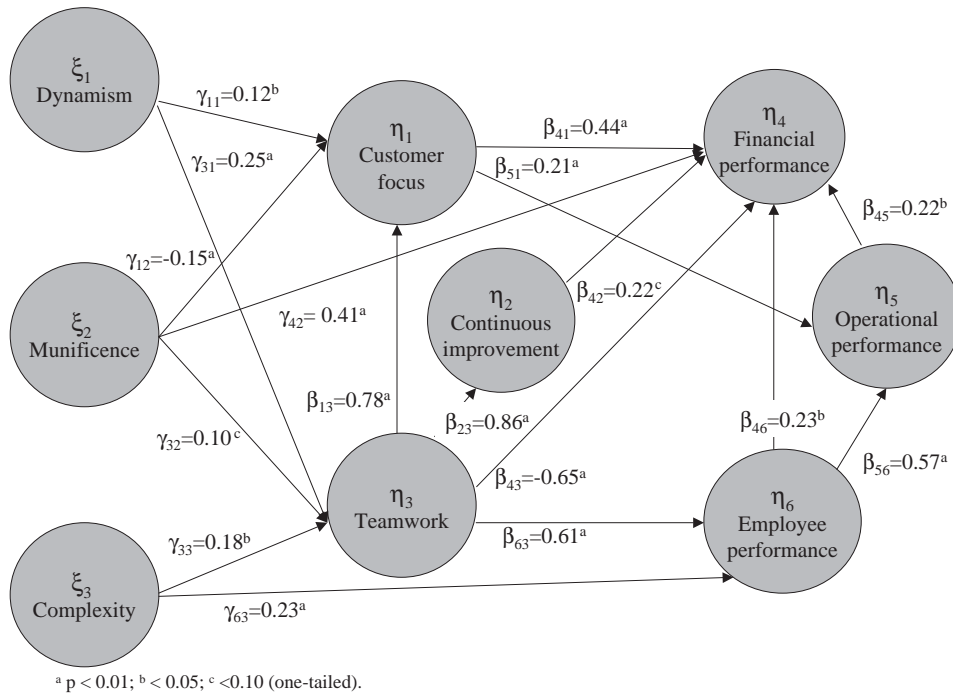


Fig. 3. Revised model of environment, TQM and organizational performance.

step to estimating the model, the multivariate normality of the data was computed by PRELIS. There were significant differences both in skewness ( $z$ -score = 76.523;  $p$ -value = 0.000) and kurtosis ( $z$ -score = 20.126;  $p$ -value = 0.000). Moreover, the joint evaluation of both confirmed such results ( $\chi^2 = 6260.79$ ;  $p$ -value = 0.000). Faced with the lack of normality in the data, we chose to use the as method of estimation the weighted least squares (WLS).

The analysis of the model proposed is structured into two parts: (a) the analysis of the measurement model; and (b) the analysis of the structural model. The purpose of a measurement model is to describe how well the observed indicators serve as a measurement instrument for the latent variables. Hence, for which purpose we examined the statistical significance of factor loadings, and subsequently, the reliabilities and extracted variances for each construct. The data proved that it was necessary to improve the model by sequentially removing those indicators with a lower individual reliability ( $R^2$ ) and take out the indicators with non-significant  $t$ -values.

In addition, according to the model generating situation suggest by Jöreskog and Sörbom [104] and with the intention of improving the overall goodness-of-fit, we sequentially removed those relationships non-significant between latent variables. Moreover, we considered the modification indices computed by LISREL that suggested that we should incorporate a direct relationship between munificence and financial performance, and between complexity and employee

performance. These modification indices are used as an approach for specifying the model again in such a way that it will improve the overall fit. In this case, the literature offered reports that supported the incorporation of such relationships. When resources are plentiful, it is relatively easy for firms to survive [105]. However, when resources are scarce, competition is greater and the firm's profitability is harmed. In their study, Kotha and Nair [106] found a positive and statistically significant relationship between munificence and profitability. Wiersema and Bantel [51] also pose this relationship empirically. As regards to complexity, it means greater specialization for the employees, a greater enrichment of tasks and more collaboration. Job enrichment may lead to lower absenteeism because the individuals will be more satisfied and will not look for excuses to miss work or seek another job [107,108]. Following all this procedure, the final model was shown on the path diagram in Fig. 3.

The check on the parameters in the structural model was established on a significance level of the one-tailed test. This is applicable when a positive or negative relationship may be specified between the variables, as was the case in our study [102]. The estimated parameters were significant at 0.05 level with the exception of the effect of munificence on cooperation ( $t = 1.61$ ) and improvement on financial performance ( $t = 1.29$ ) which were significant at 0.10 level. The hypotheses that we could support statistically and the standardized parameters that allow their interpretation are summed up in the Table 6.

Table 6  
Significant effects of revised model

Hypotheses	Effect of	On	Standardized parameter	<i>t</i> -value
H <sub>1</sub> (+)	Dynamism	Customer focus	0.12	1.95
H <sub>3</sub> (+)	Dynamism	Teamwork	0.25	2.35
H <sub>4</sub> (–)	Munificence	Customer focus	–0.15	–3.01
H <sub>5</sub> (+)	Munificence	Teamwork	0.10 <sup>a</sup>	1.61
	Munificence	Financial P.	0.41	7.02
H <sub>8</sub> (+)	Complexity	Teamwork	0.18	1.82
	Complexity	Employee P.	0.23	3.39
H <sub>10</sub> (+)	Teamwork	Continuous I.	0.86	21.52
H <sub>11</sub> (+)	Teamwork	Customer focus	0.78	13.82
H <sub>12</sub> (+)	Customer focus	Financial P.	0.44	3.37
H <sub>13</sub> (+)	Customer focus	Operational P.	0.21	2.44
H <sub>15</sub> (+)	Continuous I.	Financial P.	0.22 <sup>a</sup>	1.29
H <sub>18</sub> (+)	Teamwork	Financial P.	–0.65	–2.70
H <sub>20</sub> (+)	Teamwork	Employee P.	0.61	10.26
H <sub>21</sub> (+)	Operational P.	Financial P.	0.22	2.13
H <sub>22</sub> (+)	Employee P.	Financial P.	0.23	1.83
H <sub>23</sub> (+)	Employee P.	Operational P.	0.57	6.21

<sup>a</sup>Significant to 0.1, one-tailed.

Table 7  
Final measurement model. Exogenous constructs

	Items	Standardized parameter	<i>R</i> <sup>2</sup>	Construct reliability	Variance extracted
Dynamism ( $\xi_1$ )	D1	0.70	0.49	0.69	0.53
	D4	0.75	0.56		
Munificence ( $\xi_2$ )	M1	0.77	0.59	0.88	0.80
	M2	1.00 <sup>a</sup>	1.00		
Complexity ( $\xi_3$ )	C2	0.63	0.40	0.70	0.54
	C4	0.83	0.69		

<sup>a</sup>Error variance was fixed to 0.005.

With regards to the overall fit of the revised model, all the indicators showed an acceptable fit. Amongst the absolute fit measures, the  $\chi^2 = 247.83$  (d.f. = 151;  $p = 0.00$ ) was significant at 0.05 level. Nonetheless, in sample sizes over 200 observations, this measurement always tends to indicate significant differences for any model specified and it is recommended that other measures be used in order to analyze the goodness of the fit [102]. In this sense, the rest of the indicators were found to be within the recommended limits. The goodness of fit index (GFI) was 0.97, which shows that the variability explained by the model is very high. The RMSR = 0.10, and the RMSEA was lower than 0.05, indicating the goodness of the fit. AGFI was close to one (0.96), thus suggesting a good fit. Even more, TLI = 0.98 and NFI = 0.96 should be close to unity, as was the case in this analysis, indicating a good overall fit. Finally, the critical *N* was 214.29 and the normed chi-square ( $\chi^2/\text{df} = 1.641$ ) was also acceptable.

The analysis of the measurement model showed that the indicators of the exogenous and endogenous variables were significant for significance at 0.05 level ( $t > 1.96$ ) and the loads exceeded 0.4 (Tables 7 and 8). Furthermore, the individual reliability of each one of them was mostly greater than 0.5. All of which demonstrated that the variables correctly measured the constructs studied. With regards to the construct reliability, the latter showed a good internal consistency for the scales given that for most of them they far exceeded 0.7. The variance extracted from all the latent variables was higher than 0.5.

### 5.1. Effects of environment on TQM dimensions

The results of the analysis have shown a significantly and positive effect of dynamism on customer focus (0.12) and on teamwork (0.25), so hypotheses 1 and 3 were accepted. Nevertheless, dynamism and continuous improvement were

Table 8  
Final measurement model. Endogenous constructs

	Items	Standardized parameter	$R^2$	Construct reliability	Variance extracted
Customer focus ( $\eta_1$ )	CF1	0.86	0.74	0.92	0.79
	CF3	0.90	0.82		
	CF4	0.90	0.80		
Continuous improvement ( $\eta_2$ )	CI1	0.98	0.95	0.82	0.70
	CI2	0.66	0.44		
Teamwork ( $\eta_3$ )	T4	0.77	0.59	0.82	0.60
	T6	0.82	0.66		
	T8	0.85	0.72		
Financial ( $\eta_4$ )	FP1	0.94	0.88	0.92	0.86
	FP2	0.91	0.84		
Operational ( $\eta_5$ )	OP5	0.82	0.68	0.76	0.61
	OP6	0.74	0.54		
Employees ( $\eta_6$ )	EP1	0.81	0.74	0.78	0.64
	EP2	0.65	0.53		

not statistically related (hypothesis 2 was not supported). In the case of munificence, the negative relationship with customer focus (hypothesis 4) was supported, as well as the positive relationship with teamwork (hypothesis 5). Finally, complexity was observed to have a positive and statistically effect on teamwork (0.18), but hypotheses 6 and 7 were not statistically supported.

### 5.2. Relationships between the dimensions of TQM

The results of the analysis have shown positive significant effects as expected from teamwork on continuous improvement (0.86) and customer focus (0.78). As may be seen, the size of such effects is large, thus highlighting the importance of cooperation for achieving both dimensions. However, hypothesis 9, which relates continuous improvement to customer focus, was not statistically supported.

### 5.3. Effects of TQM dimensions on performance

Customer focus had a significant effect on financial performance (0.44) and operational performance (0.21), thus supporting hypotheses 12 and 13. However, hypothesis 14, which proposed the relationship between customer focus and employee performance, was not supported by the results of the analysis. Continuous improvement only had influence on financial performance (0.22), failing to support hypotheses 16 and 17. Teamwork had a negatively impact on financial performance (−0.65), therefore, the hypothesis 18 was not supported in the direction that was expected. This negative effect indicates that the greater the cooperation, the lower the financial performance will be. Nonetheless, we observed that the indirect effect of teamwork on financial performance was positive and much higher. Teamwork was

the only TQM dimension of the study that had a significant direct effect on employee performance (0.61).

The remaining three hypotheses (Hypotheses 21, 22 and 23) including the relationship among financial, operational and employee performance, were supported. Operational performance was positively related to financial performance (0.22), whereas employee performance was positively related to financial performance (0.23) and operational performance (0.57). Moreover, munificence was also a significant and positive influence on financial performance (0.41) and complexity on employee performance (0.23).

## 6. Discussion and conclusions

The causal model posed allows us to analyze which dimensions of the environment are those that exercise the greatest influence on the implementation of the basic principles of TQM, and how they contribute to organizational effectiveness. In general terms, the results indicate support for the relationship between organizational characteristics, TQM principles, and performance. Dynamism, munificence and complexity directly or indirectly influence the three principles of TQM. Likewise, the dimensions of TQM have an impact on the different types of performance. In particular the results indicate that:

1. Dynamism and munificence directly influence customer focus that points to customer satisfaction as the most important requirement for long-term organizational success. Higher levels of customer focus are associated with more frequent changes in environment. However, when environment is not very competitive and present few difficulties for the firm's development or growth, TQM firms respond by placing less emphasis on customer focus activities. In munificent environments organizations

accumulate scant resources that are necessary for their survival [109], therefore, the firm can focus on a small group of customers that will guarantee a minimum income for it.

2. The results do not support that dynamism, munificence and complexity directly affect continuous improvement. Nevertheless, such effects have an indirect effect on continuous improvement, through the mediating effect of teamwork. These findings suggest that environmental characteristics are not associated with high levels of continuous improvement, which involves an attempt to enhance firm products and processes as a means for satisfying the customer.
3. Teamwork is directly and positively related to dynamism, munificence and complexity. In environments with a high level of instability, with diversity in the activities for satisfying the customers, but with resources favorable for growth, the collaboration between the firm members in different scopes will be greater. This cooperation is important given its influence on customer focus and continuous improvement.
4. Financial performance measured as the firm's profits and the profitability has been positively and directly determined by customer focus and continuous improvement, and negatively by teamwork. Nonetheless, it is possible to check that the indirect and positive effect of teamwork is greater. The direct and negative relationship between teamwork and financial performance should be explained considering that a high level of collaboration demands suitable personnel who are trained for this. This might turn out to be costly since it will mean extra expenses for recruitment, staff selection, training, specialization, and etc. [79]. According to Haptom [110] firms like Mazda spent around US\$ 13,000 for each production employee hired for these matters. On the other hand, achieving collaboration and participation from the staff requires setting up a suitable system of rewards with additional payments and different forms of recognition [111,112].
5. Customer focus is positively associated with operational performance, as would be expected. Continuous improvement has a role for mediation but not a direct one in the improvement of product and service quality. In the study by Anderson et al. [98] they did not find a direct significant relationship between continuous improvement and customer satisfaction either. One reason already put forward by these authors is that such a result might be due to the existence of correlation between continuous improvement and other dimensions of TQM, specifically, in our case, with customer focus and teamwork.
6. Teamwork is the only TQM dimension to positively influence employee performance. Regardless of the fact that continuous improvement or customer focus may mean great significance for the work performed, employee satisfaction is an attitude that depends on multiple aspects which might affect the significance of the relationship. The study by Wilkinson et al. [113] suggests that the

employees' reaction towards TQM may vary from one organization to another depending on the style of management. Management style would seem to be one of the main factors that determines the employees' reaction. The employees who express doubts about TQM are those who are least convinced by the scope of the change in the attitudes and behavior of the managers. However, in the case of the relationship between teamwork and employee satisfaction, other factors may be influential such as the relationship with colleagues or with their immediate supervisor. Higher levels of satisfaction are possible when the direct superior is understanding and friendly, congratulates people for good performance, listens to their opinions and shows personal interest in them.

Though the study provides some useful insights into the role of organizational environment in the relationship of TQM and performance, certain limitations should be recognized. First, the cross-sectional research design limits the extent to which inferences can be made about the causal ordering of variables. While causal relationships can be inferred, they cannot be strictly proven. A longitudinal research design would be necessary to properly test causality. However, as Steenkamp and Baumgartner [114] point out, the use of structural equation models for cross-sectional data analysis, is effective in analyzing models that establish several equations describing the interrelationships among several endogenous and exogenous variables. Another limitation is that some of the relations established in the model did not obtain a very high statistical significance. This is the case in the effect of continuous improvement on financial performance or in that of munificence on teamwork. These relationships should be taken cautiously and be verified in future studies. In this sense, we have to bear in mind that, although the final proposed model shows a good fit, there may be alternative causal models that also fit well. Finally, we should not overlook the limitations derived from using subjective measures for the different variables considered. Ideally, the relations described should be compared using objective information, particularly in the case of performance.

## 7. Managerial implications

The foregoing discussion and conclusions suggest several implications for the managers of firms planning to implement TQM. TQM is especially suited for firms that compete in dynamic sectors. In these cases greater customer focus is achieved and the teamwork in the firm is reinforced to a great extent. The greater the demands for adapting to changes imposed by technological improvement or the competitors grant the firm greater flexibility and capacity for reaction. Moreover, significant knock-on effects may be achieved in terms of profits, product quality and employee satisfaction. On the opposite, greater stability in the environment and



greater adaptation to routine situations leads to the less customer orientation and lower levels of participation and teamwork. Consequently, firms located in stable environments will find it more difficult to implement TQM and achieve profits, since the restrictions in the environment are less noticeable. In these cases, the success in implementation and in the results might be achieved if the need was to arise from within the organization itself and the efforts made were kept up.

Firms located in munificent environments have greater facilities for improving profitability and profits regardless of the implementation of the principles of TQM, since the abundance of resources influences financial performance directly. Firms with TQM that compete in munificent environments might deem that promoting the relationships with customers is less important for their development, although munificence will allow them to achieve greater cooperation, and therefore, greater employee satisfaction and higher levels of product and service quality. Hence, in munificent environments, firms must pose the true need for implementing TQM in their firms. Possibly, the financial performance that is achieved will not be much higher than the level prior to its implementation. On the one hand, the growth in demand and the favorable market opportunities guarantee, by themselves, that profits and profitability will be obtained. Moreover, munificence has a negative effect on customer focus commitment, and this may have a negative effect, not just on profits, but also on the firm's strategies or its image on the market. Despite this, some advantages might be obtained deriving from the greater cooperation that would improve employee and financial performance.

In the case of firms that operate in environments with a high level of complexity, understood as heterogeneity in the products and services offered to the customers, and in the forms of competing, TQM is recommended for improving the levels of cooperation within the firm. This would increase the degree of employee satisfaction, and indirectly, product quality and profits. Therefore, in homogeneous environments, the implementation of TQM may be less necessary since the organization finds it easier to set up common procedures that will allow it to relate to its environment and make organizational activities easier. Although, this may mean giving up higher levels of performance, especially from the employees' point of view.

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### Appendix A. Measures

Items indicated with [—] are reverse scored.

The items with (\*) have been deleted in the confirmatory factor analysis.

The items with (\*\*) have been deleted in the analysis of measurement model in the structural equations model.

#### A.1. TQM principles

##### (a) Customer focus

CF1. Our processes and activities are centered on satisfying our customers.

CF2. Managers and supervisors encourage activities that improve customer satisfaction. (\*)

CF3. Satisfying our customers, and meeting their expectations, is the most important thing we do.

CF4. Senior executives behave in ways that lessen the importance of customers. (—)

##### (b) Continuous improvement

CI1. This organization encourages continual study and improvement of all its products, services and processes.

CI2. Employees usually don't get an opportunity to suggest changes or modifications to existing processes (—).

CI3. Many of our products/services have been improved in the recent past. (\*\*)

CI4. This organization has received recent compliment and recognition for improving its products/services/processes. (\*)

##### (c) Teamwork

T1. Managers emphasize activities that lead to a lack of cooperation between our organization and our suppliers. (—)(\*\*)

T2. Management encourages use of few suppliers based on quality rather than on price alone. (\*)

T3. Managers, supervisors, and employees from different departments work independently to achieve their own department's goals. (—)(\*\*)

T4. In this organization, teamwork is commonplace—the expected way of doing business.

T5. In this organization, everyone participates in improving our products, services, and processes. (\*\*)

T6. Senior executives look at the “whole picture” when they make decisions.

T7. Employees are hesitant to voice their opinions, make suggestions, or inquire about any of the activities of the organization. (—)(\*)

T8. Senior executives insist on accuracy and reliability of all information and communications within the organization.

#### A.2. Environmental dimensions

##### (a) Dynamism

D1. Changes in technology of new products/services/operation processes.

D2. Changes in taste and preferences of customers. (\*\*)

D3. Changes in the rate at which products/services become obsolete. (\*\*)

D4. Changes in market activities of your key competitors.

## (b) Munificence

M1. Demand for the products/services of your industry have been growing.

M2. The investment or marketing opportunities for firms our your industry have been very favorable.

M3. The growth/decrease in the sector has been easy predictable. (\*)

M4. Market activities of your key competitors have been very hostile. (\*)

M5. Market activities of your key competitors have affected the firm in many areas (pricing, marketing, delivery, service, etc.) (\*)

## (c) Complexity

C1. Your firm has required many different methods of production or service. (\*\*)

C2. A great diversity in marketing tactics has been accomplish in order to cater to different customers.

C3. The tastes and preferences of customers have been very heterogeneous. (\*\*)

C4. The nature of competition and the tactics of the competitors have been very heterogeneous.

## A.3. Organizational performance

## (a) Financial performance

FP1. Growth in profits.

FP2. Profitability growth.

## (b) Operational performance

OP1. Sales growth. (\*)

OP2. Market share growth. (\*)

OP3. Reducing customer complaints. (\*)

OP4. Level of satisfaction customer. (\*\*)

OP5. Level of defects in the products/services.

OP6. The products/services quality to meet or exceed customer's demands.

## (c) Employee performance

EP1. Level of employee satisfaction

EP2. Level of absenteeism

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