An empirical assessment of the EFQM Excellence Model: Evaluation as a TQM framework relative to the MBNQA Model

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1. Introduction

Since the 1990s, most firms have used the models underpinning quality awards, such as the Deming Prize (DP Model) in Japan, the Malcolm Baldrige National Quality Award (MBNQA) Model in the USA, and the European Quality Award (EFQM Excellence Model) in Europe, as a framework for implementing TQM initiatives. Many researchers have considered quality models as operational frameworks for TQM (e.g., Bohoris, 1995; Ghobadian and Woo, 1996; Cukrovic et al., 2000; Van der Wiele et al., 2000; Yong and Wilkinson, 2001; Lee et al., 2003). These authors consider that quality award models reproduce TQM by capturing its main constituent parts and by replicating its core ideas in clear and accessible language. Nevertheless, the empirical validation of the extent to which these models capture TQM is scarce, partial, and limited to some empirical studies such as Cukrovic et al. (2000), who conclude that MBNQA and its criteria do capture TQM core concepts. In the context of the EFQM Excellence Model, this question remains unanswered and, therefore, more research is needed.

The purpose of this paper is to analyze the extent to which the EFQM Excellence Model captures the main assumptions involved in the TQM concept, that is, the distinction between technical and social TQM issues, the holistic interpretation of TQM in the firm, and the causal linkage between TQM procedures and organizational performance.

Based on responses collected from managers of 446 Spanish companies by means of a structured questionnaire, we find that: (a) social and technical dimensions are embedded in the model; (b) both dimensions are intercorrelated; (c) they jointly enhance results. These findings support the EFQM Excellence Model as an operational framework for TQM, and also reinforce the results obtained in previous studies for the MBNQA, suggesting that quality award models really are TQM frameworks.

Keywords:
Total quality management
EFQM Excellence Model
MBNQA
Structural equation models
Empirical research

ARTICLE INFO

ABSTRACT

Total quality management (TQM) is an approach to management embracing both social and technical dimensions aimed at achieving excellent results, which needs to be put into practice through a specific framework. Nowadays, quality award models, such as the Malcolm Baldrige National Quality Award (MBNQA) and the European Foundation for Quality Management (EFQM) Excellence Model, are used as a guide to TQM implementation by a large number of organizations. Nevertheless, there is a paucity of empirical research confirming whether these models clearly reflect the main premises of TQM. The purpose of this paper is to analyze the extent to which the EFQM Excellence Model captures the main assumptions involved in the TQM concept, that is, the distinction between technical and social TQM issues, the holistic interpretation of TQM in the firm, and the causal linkage between TQM procedures and organizational performance.

Based on responses collected from managers of 446 Spanish companies by means of a structured questionnaire, we find that: (a) social and technical dimensions are embedded in the model; (b) both dimensions are intercorrelated; (c) they jointly enhance results. These findings support the EFQM Excellence Model as an operational framework for TQM, and also reinforce the results obtained in previous studies for the MBNQA, suggesting that quality award models really are TQM frameworks.

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Table 1
Different views of the core concepts which constitute TQM and their embedding in the TQM framework

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<td>Dutch adaptation of the EFQM framework</td>
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<td>Eskildsen (1998)</td>
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<td>Eskildsen and Dahlgaard (2000)</td>
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<td>Eskildsen et al. (2000)</td>
<td>EFQM Excellence Model 1999</td>
<td>Causal</td>
<td>To analyze the relationships between the 9 criteria of the EFQM Excellence Model theoretically and then test these relations empirically</td>
<td>Leadership affects People, Policy and Strategy, and Partnerships and Resources. People, Policy and Strategy, and Partnerships and Resources affect Processes. Moreover, People affect People Results, and Partnerships and Resources influences Society Results. Processes affect People Results, Customers Results, and Society Results. People results and Customers results affect Key Performance Results</td>
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<td>Reiner (2002)</td>
<td>Austrian Quality Award (comparable to the EFQM Excellence Model)</td>
<td>Causal</td>
<td>To analyze the dependences between the EFQM criteria</td>
<td>There is a direct dependence between the criteria. Confirms the central position of Policy and strategy criterion and the interrelationships between the enabler criteria, and between the result criteria. There is no direct relationship between Processes and Customer satisfaction or between People management and People satisfaction</td>
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<td>Bou-Llusar et al. (2005)</td>
<td>EFQM Excellence Model 1999</td>
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<td>Focus on the interrelationship between all the elements in the EFQM Excellence Model and conclude that the enablers factor, as a whole, improve results</td>
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<td>Calvo-Mora et al. (2005)</td>
<td>EFQM Excellence Model 2003</td>
<td>Causal</td>
<td>To analyze the validity and predictive power of the EFQM Excellence Model adapted to the university sphere and to test the relationships implicit in this model</td>
<td>Establishes the relationship (two by two) between the EFQM criteria (result criteria are adapted to university context). The leadership and commitment of the management have a positive influence on people management, policy and strategy and partnerships and resources. Policy and strategy have a positive influence on people management, partnerships and resources and process management. People management has a positive influence on process management. Partnership and resources have a positive influence on process management. Process management has a positive influence on people results and the centre results. People results have a positive influence on the centre results and the student results. Student results have a positive influence on the centre results. The centre results have a positive influence on social results</td>
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<td>Winn and Cameron (1998)</td>
<td>Malcolm Baldrige National Quality Award 1992</td>
<td>Causal</td>
<td>To examine the validity of the proposed relationships among the MBNQA dimensions using data from higher education</td>
<td>They did not validate all the relationships in the Baldrige framework, and they use exploratory analysis to derive an alternative model that was statistically significant. They present a framework showing the direct effects of leadership on each of the four system dimensions and conclude that leadership affects the results by mediating effects through the system dimensions.</td>
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<td>Curkovic et al. (2000)</td>
<td>Malcolm Baldrige National Quality Award 1997</td>
<td>Factorial</td>
<td>To assess the MBNQA in terms of its ability to capture the major dimensions of the unobserved variable known as TQM</td>
<td>MBNQA criteria could be summarized into 4 constructs: TQM strategic systems, TQM operational systems, TQM information systems, TQM results. TQM is a second order construct that captures the relationships between the four constructs of the MBNQA. The underlying theory of the MBNQA is supported. Leadership is the most important driver of system performance and affects financial results through systems elements. Information and analysis is the second most important category. Process management affects customer satisfaction much more than it does financial results.</td>
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<tr>
<td>Wilson and Collier (2000)</td>
<td>Malcolm Baldrige National Quality Award 1995</td>
<td>Causal</td>
<td>To empirically test the relationships between the Baldrige Award constructs</td>
<td>Leadership is a driver of all components of the Baldrige System (information and analysis, strategic planning, human resource development and management, and process management). Leadership and information and analysis are linked with organizational performance resources; while human resource development, management and process management links with customer satisfaction.</td>
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<td>Meyer and Collier (2001)</td>
<td>Malcolm Baldrige National Quality Award Health Care Criteria 1995</td>
<td>Causal</td>
<td>To test the causal relationships in the MBNQA Health Care Pilot Criteria. A measurement model is also validated</td>
<td>Leadership is a driver of all components of the Baldrige System (information and analysis, strategic planning, human resource development and management, and process management). Leadership and information and analysis are linked with organizational performance resources; while human resource development, management and process management links with customer satisfaction.</td>
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<tr>
<td>Pannirselvam and Ferguson (2001)</td>
<td>Malcolm Baldrige National Quality Award 1993</td>
<td>Causal</td>
<td>To analyze the validity of the proposed relationships between the categories in the MBNQA, modifying the framework, separating customer focus and satisfaction into two separate constructs</td>
<td>Leadership significantly directly or indirectly affects all of the systems constructs, except for strategic quality planning and information management, which was not tested in the model. The results also indicate that information management, human resources management and customer focus have a significant effect on customer satisfaction and business results. A strong focus on customers and employees, in addition to effective leadership and information management is clearly shown to be essential for organizational success.</td>
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<tr>
<td>Flynn and Saladin (2001)</td>
<td>Malcolm Baldrige National Quality Award 1988, 1992, 1997</td>
<td>Causal</td>
<td>To test the relationships between constructs underlying categories of the MBNQA in 3 editions of the model, and to assess its development</td>
<td>They found that each of the three models was relatively strong, indicating that the Baldrige frameworks all include robust relationships. Significant relationships exist among Baldrige categories 1 through 6 (leadership; strategic planning; focus on patients, other customer and markets; information and analysis; staff focus; process management) and each of the 5 results between category 7 organizational performance results (patient and customer satisfaction; health care results; financial and market results; staff and work system results; organization-specific results) Results support the theory underlying the Baldrige award. Leadership is critical in securing a customer and market focus and strategic planning. Customer and market focus is a crucial input to strategic planning. Strategic planning, mediated by the use of information and analysis and by human resources focus, is the driver of process management. Business results are the outcome of this planning process. The modified model supports the general theory behind MBNQA criteria. Better quality results can be challenged through &quot;within-the-system&quot; quality drivers and quality information and analysis.</td>
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<tr>
<td>Goldstein and Schweikhart (2002)</td>
<td>Baldrige Health Care Criteria 1999</td>
<td>Causal</td>
<td>To investigate the extent to which the improvement in the 6 first Baldrige criteria leads to improved results</td>
<td>Leadership is critical in securing a customer and market focus and strategic planning. Customer and market focus is a crucial input to strategic planning. Strategic planning, mediated by the use of information and analysis and by human resources focus, is the driver of process management. Business results are the outcome of this planning process. The modified model supports the general theory behind MBNQA criteria. Better quality results can be challenged through “within-the-system” quality drivers and quality information and analysis.</td>
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<td>Ghosh et al. (2003)</td>
<td>Malcolm Baldrige National Quality Award 2000</td>
<td>Causal</td>
<td>To propose and test a structural equation model that empirically validates the relationships between categories of the award</td>
<td>Leadership is critical in securing a customer and market focus and strategic planning. Customer and market focus is a crucial input to strategic planning. Strategic planning, mediated by the use of information and analysis and by human resources focus, is the driver of process management. Business results are the outcome of this planning process. The modified model supports the general theory behind MBNQA criteria. Better quality results can be challenged through “within-the-system” quality drivers and quality information and analysis.</td>
</tr>
<tr>
<td>Lee et al. (2003)</td>
<td>Adapted the MBNQA 2001 as 7 quality management dimensions</td>
<td>Causal</td>
<td>To test the link between MBNQA criteria and performance. A survey instrument was developed based on the specific criteria of the MBNQA</td>
<td>Leadership is critical in securing a customer and market focus and strategic planning. Customer and market focus is a crucial input to strategic planning. Strategic planning, mediated by the use of information and analysis and by human resources focus, is the driver of process management. Business results are the outcome of this planning process. The modified model supports the general theory behind MBNQA criteria. Better quality results can be challenged through “within-the-system” quality drivers and quality information and analysis.</td>
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The paper is structured as follows. In the next section, we present a review of previous literature in order to present quality award models as TQM implementation frameworks. Based on the review of the literature, a research model to assess the capability of the EFQM Excellence Model to reproduce the TQM concept is offered in Section 3. Section 4 describes the methodology, and attention is paid to the survey procedure and the construction of measures. Finally, Sections 5 and 6 present the results of the empirical study carried out and the main conclusions and implications stemming from this research.

2. Review of the literature

2.1. Definition of TQM

A variety of definitions of total quality management (TQM) have been offered over the years. Reviewing previous contributions (e.g. Dean and Bowen, 1994; Sitkin et al., 1994; Hackman and Wageman, 1995; Wilkinson et al., 1998; Oakland, 2000; Dale, 2003; Eriksson and Garvare, 2005) a dominant insight among experts seems to define TQM as an approach to management characterized by some guiding principles or core concepts that embody the way the organization is expected to operate, which, when effectively linked together, will lead to high performance. Although with some differences, there is a general agreement regarding the assumptions included in the TQM concept, which can be summarized in three main points.

Firstly, the core concepts of TQM can be classified into two broad categories or dimensions: social or soft TQM, and technical or hard TQM (Dotchin and Oakland, 1992; Yong and Wilkinson, 2001; Prajogo and Sohal, 2004; Rahman, 2004; Rahman and Bullock, 2005; Lewis et al., 2006). The social issues are centered on human resource management and emphasize leadership, teamwork, training, and employee involvement. The technical issues reflect an orientation toward improving production methods and operations and seek to establish a working method through the establishment of well-defined processes and procedures to make possible the constant improvement of goods and services to customers.

Secondly, the management of social or technical TQM issues cannot be performed in isolation. Social and technical dimensions (and the core concepts that form them) should be interrelated and mutually support one other (Flynn et al., 1994; Wruck and Jensen, 1994; Hackman and Wageman, 1995; Sun, 1999) reflecting the holistic character of TQM initiatives. This holistic character is also extended to the expected results of a TQM initiative, as a balance of the stakeholders’ interests should be considered when the firm defines TQM practices (Stainer and Stainer, 1995; Oakland and Oakland, 1998; Fissher and Nijhof, 2005).

Thirdly, the literature suggests that the optimal management of TQM core concepts will lead to better organizational performance, as studies such as Powell (1995), Terziovski and Samson (1999), Zhang (2000), Hendricks and Singhal (2001), or Kaynak (2003) have verified. The basic theoretical foundation for this relation-
ship is based on the assumption that TQM provides superior value to the customer by identifying customers' expressed and latent needs, responsiveness to changing markets, as well as through improving the efficiency of the processes that produce the product or service (Reed et al., 1996; Anderson et al., 1995).

2.2. Quality award models as TQM frameworks

There is a general agreement that a systematic method or framework is needed to put TQM into practice. However, there is no universally accepted TQM framework (Yusof and Aspinwall, 2000), and different approaches coexist in the literature, including consultants-based frameworks (e.g. Deming, 1986; Crosby, 1980; Juran and Gryna, 1993), standardized frameworks such as the ISO 9000:2000 series (Askey and Dale, 1994; Tummala and Tang, 1996; Kartha, 2004); and other models based on critical factors of TQM (e.g. Saraph et al., 1989; Flynn et al., 1994; Ahire et al., 1996; Grandzol and Gershon, 1998; Dow et al., 1999).

In addition, several authors (e.g. Bohoris, 1995; Ghobadian and Woo, 1996; Hendricks and Singhal, 1996; Cukrovic et al., 2000; Yong and Wilkinson, 2001) have proposed that models based on quality awards fit the definition of TQM, take into account its major constituents, and could therefore be considered valid frameworks for TQM. This assumption is based on the correspondence between award criteria and TQM core concepts, as Table 1 illustrates.

However, studies that have assumed quality award models as TQM frameworks have not validated empirically this assumption. The studies that have analyzed quality award models have generally focused on examining their internal structure (see Table 2 for a review), adopting a causal approach and testing only isolated associations between certain criteria while ignoring the interrelationships between all their dimensions (i.e., the big picture); or a factorial approach, when all the elements of the model are intercorrelated, which shows the existence of a common approach to implementing a TQM initiative. However, with the exception of Cukrovic et al. (2000) for the MBNQA, none of them have analyzed whether the internal structure of the models matches the definition of TQM. Additional research is therefore needed, mainly in the case of the EFQM Excellence Model, to empirically assess whether quality award models represent TQM.

3. The EFQM Excellence Model as a TQM framework: model and research questions

The EFQM Excellence Model was created in 1991 by the European Foundation for Quality Management (EFQM) as a framework against which applicants for the European Quality Award are judged, and to recognize organizational excellence in European companies. Nowadays, EFQM brings together more than 700 members located in many countries across the world. The EFQM Excellence Model is made up of nine elements grouped under five enabler criteria (leadership, policy and strategy, people, partnerships and resources and processes) and four result criteria (people results, customer results, society results and key performance results) (Fig. 1).

The enablers represent the way the organization operates, and the results concentrate on achievements relating to organizational stakeholders (EFQM, 2003). The meaning of each criterion is summarized in Table 3. Each criterion is broken down into several sub-criteria and each sub-criterion is illustrated with various “guidance points” exemplifying what the organization has to do in order to develop the criteria.

In the European context, the EFQM Excellence Model is considered to constitute a valid representation of TQM (Ghobadian and Woo, 1996; Eskildsen, 1998; Van der Wiele et al., 2000; Westlund, 2001); however, there are no studies that have addressed this question empirically. To investigate this important issue, we need to test whether the internal structure of the EFQM Excellence Model captures the main assumptions of TQM: the distinction between technical and social TQM issues, the holistic interpretation of TQM in the firm, and the causal linkage between TQM procedures and organizational performance.

3.1. Social and technical TQM dimensions in the EFQM Excellence Model

According to the definition of TQM adopted in our study, TQM comprises both technical and social dimensions. Our first research question is therefore addressed to determining whether these two dimensions are separately identifiable in the internal structure of the EFQM Excellence Model. This objective involves focusing on the enabler side of the EFQM Excellence Model.

Enablers in the EFQM Excellence Model embrace the processes, structures and means that the organization can use to manage quality (Nabitz and Klazinga, 1999). In order to analyze whether the EFQM represents separately the social and technical dimensions of TQM, we classify the enabler criteria into categories to capture the multidimensionality of the TQM construct. In this regard, following the categorization proposed by Yong and Wilkinson (2001), Cua et al. (2001) or Rahman (2004), the enabler side of the model is organized by following the distinction between the “social” (soft) aspects and the “technical” (hard) aspects of TQM. According to this classification, Brown (2002) suggests that the social dimension of TQM is represented in the EFQM Model through “people” and “leadership”, while “processes” and “partnerships and resources” comprise technical aspects. On the other hand, “policy and strategy” guides the management of the remaining criteria and contains items that relate to both soft and hard issues (Black and Porter, 1995). Reiner (2002) provided empirical evidence about the central position of the “policy and strategy” criterion in the EFQM Excellence Model, which constitutes a tool for integrating the content of the rest of criteria. In this vein, Castresana and Fernández-Ortiz (2005) posit that “Policy and Strategy” captures the organization’s efforts to develop a stakeholder-based strategy taking into account the characteristics of the market and sector in which the firm operates. The left side of Fig. 2 shows the structure of the enabler criteria as defined above.

RQ1: Do separately identifiable technical and social factors exist as expressed in the EFQM?
3.2. The holistic interpretation of TQM in the EFQM Excellence Model

The internal structure of the EFQM model should also reflect the holistic character of the TQM initiatives and consider the interrelationships in both the enabler and the result criteria.

3.2.1. Interrelationships within the enabler domain

The implementation of quality practices in concert with one another is necessary in order to realize the full benefits of TQM (Tamimi, 1998). Some empirical work supports the existence of interrelationships between the enabler side of the EFQM Excellence Model (Dijkstra, 1997; Eskildsen, 1998; Eskildsen and Dahlgaard, 2000; Prabhu et al., 2000; Reiner, 2002; Bou-Llusar et al., 2005), based on the assumption that these criteria are components of the unique TQM philosophy. As Eskildsen et al. (2000) suggest, previous research on the causal structure of the EFQM Excellence Model has shown that the enabler criteria are linked together in a very complex structure, making it very difficult to discern between them. Enabler excellence is thus interpreted in this study as the overall approach that firms should adopt when they implement the EFQM, and this is reflected in the level achieved by the firm in both the social and technical dimensions, together with the policy and strategy criteria. According to this interpretation of the enabler side of the EFQM Excellence Model, changes in one dimension are related to changes in other dimensions, and there is therefore a reciprocal interdependence between all enabler components. This interdependence is represented by the common latent factor enabler excellence (see the left side of Fig. 2).

This conceptualization of the enabler side of the model maintains clear parallelisms with the study by Dijkstra (1997), who maintains the existence of a common latent general factor that causes the associations between the enablers. Likewise, Dow et al. (1999) show that the main quality management dimensions are usually implemented in combination with one other, and that they show a high level of correlation with the other dimensions. Our second research question addresses this issue.

Table 3

<table>
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<tr>
<th>Criterion</th>
<th>Definition</th>
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<tr>
<td>Leadership</td>
<td>Excellent leaders develop and facilitate the achievement of the mission and vision. They develop organisational values and systems required for sustainable success and implement these via their actions and behaviours</td>
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<tr>
<td>Policy and strategy</td>
<td>Excellent organisations implement their mission and vision by developing a stakeholder focused strategy that takes account of the market and sector in which it operates. Policies, plans, objectives and processes are developed and deployed to deliver strategy</td>
</tr>
<tr>
<td>People</td>
<td>Excellent organisations manage, develop and release the full potential of their people at an individual, team-based and organisational level. They promote fairness and equality and involve and empower their people</td>
</tr>
<tr>
<td>Partnerships and resources</td>
<td>Excellent organisations plan to manage external partnerships, suppliers and internal resources in order to support policy and strategy and the effective operation of processes</td>
</tr>
<tr>
<td>Processes</td>
<td>Excellent organisations design, manage and improve processes in order to fully satisfy, and generate increasing value for, customers and other stakeholders</td>
</tr>
<tr>
<td>Customer results</td>
<td>Excellent organisations comprehensively measure and achieve outstanding results with respect to their customers</td>
</tr>
<tr>
<td>People results</td>
<td>Excellent organisations comprehensively measure and achieve outstanding results with respect to their people</td>
</tr>
<tr>
<td>Society results</td>
<td>Excellent organisations comprehensively measure and achieve outstanding results with respect to society</td>
</tr>
<tr>
<td>Key performance results</td>
<td>Excellent organisations comprehensively measure and achieve outstanding results with respect to the key element of their policy and strategy</td>
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Source: adapted from EFQM (2003).
RQ2: Will the enablers in the EFQM Excellence Model be presented as a latent factor that produces the complementarities between their components?

3.2.2. Interrelationships within the result domain

Performance measurement within a TQM framework should include both hard and soft measures, as well as the management and employee perspective (McAdam and Bannister, 2001). Moreover, results on one level contribute to outcomes on others, and interrelationships between the results are expected from a TQM initiative (Oakland and Oakland, 1998; Evans and Jack, 2003).

The results set in the EFQM Excellence Model includes this kind of measure, as it collects the measure of both tangible and economic terms, together with less tangible measures, such as customer perspective or employee motivation. In the same vein, as suggested by some authors (e.g. Kaplan and Norton, 1992), the hard business results considered in the EFQM Model should be linked to the less tangible attributes. Excellence consists not only of the achievement of key business results but also of satisfying internal and external customers, and the society in which the organization performs its activity (Nabitz et al., 2001). The use of this composite of measures is intended to ensure that strategies are balanced and that they do not make inappropriate trade-offs between important stakeholders. The empirical evidence in the context of the EFQM Excellence Model also supports significant interrelationships between the result elements (Reiner, 2002; Calvo-Mora et al., 2005). As previously noted from the enabler perspective, the structure of the model highlights an internal logic between the result elements (Ghobadian and Woo, 1996). Westlund (2001) explicitly recognizes the linkages between the result criteria in order to develop a “society environmental index”. The logic implicit in the EFQM Excellence Model considers that excellence involves balancing the needs of all stakeholders (Nabitz and Klazinga, 1999).

The level of excellence achieved by any organization is therefore reflected in all the result criteria, as they are conceived as manifestations of an underlying factor that represents the result excellence of organizations. This factor encompasses the equilibrium in the satisfaction of the organizational interest groups’ needs and it explains the common variation in the four result indicators. The right side of Fig. 2 shows the factorial structure of the result domain. The factorial view also recognizes that the interrelationships between results are explained by the underlying factor result excellence. This idea is summarized in our third research question.

RQ3: Will the results in the EFQM Excellence Model be presented as a latent factor that produces the complementarities between their components?

3.3. The influence of TQM on organizational performance in the EFQM Excellence Model

A fundamental premise in TQM literature is that the introduction of a TQM initiative leads to improved company performance and competitiveness. Although quality award models are not prescriptive in nature, and they do not state a clear interrelationship among their elements, a general consensus exists concerning a positive influence of systems on results. This belief was included in the MBNQA, which states that the leadership triad (leadership, strategic planning, and customer and market focus) is linked to the results triad (workforce focus, process management, and results) (MBNQA, 2007). This premise is adopted by the EFQM Excellence Model when states that “excellent results with respect to performance, customers, people and society are achieved through leadership driving policy and strategy, which is delivered through people, partnerships and resources, and processes” (EFQM, 2003). Moreover, the model structure emphasizes the need to drive the activities in the organization systematically with the intention of improving results (Black and Crumley, 1997).

Early studies addressed this topic. As seen in Table 2, Eskildsen (1998), Prabhu et al. (2000), Eskildsen and Dahlgaard (2000), Eskildsen et al. (2000), Reiner (2002) or Calvo-Mora et al. (2005) conclude that some organizational results depend on the management of some enabler criteria. Nevertheless, the above-mentioned studies do not fully capture the complexity of the EFQM Excellence Model, as they do not consider the complete set of criteria neither the complete intercorrelations between them. Therefore, research focused on isolated criteria or linkages does not allow a whole assessment of the EFQM Model as a...
TQM framework. In order to avoid this limitation, it is necessary to test whether all enablers explain the excellence in the result domain. In our model, this matter is addressed in following research question and is implemented considering the influence of enabler excellence on result excellence.

RQ4: Will enablers have a positive influence on results in the EFQM Excellence Model?

In summary, our analysis of the EFQM Excellence Model has led to the structural model illustrated in Fig. 2. The empirical validation of the proposed structural model will enable us to examine the extent to which the TQM dimensions (social vs. technical) are included in the EFQM Excellence Model. Moreover, the model will provide some insights in how excellence in the enablers explains the achievement of excellent results by simultaneously considering the intercorrelations between all the elements of the model caused by the latent factors enabler excellence and results excellence. The validation of this model will allow us to determine whether EFQM effectively reflects the main TQM assumptions and could be considered an operational framework for TQM.

4. Methodology

4.1. Sample

The multidimensional structural model proposed to analyze the EFQM framework was tested using relevant data from a survey on quality practices, competences, and performance compiled by the authors. The sample of companies was obtained from the Spanish national “ARDAN” information service which provides information on more than 100,000 firms. In ARDAN firms can be selected according to various classification criteria such as sector, name, activity, size or location. In order to avoid possible bias in the selection of firms in the sample, we used the stratified sampling method. The distribution of the sample throughout the different groups was performed by dividing it into proportional parts of the population of each stratum according to sector and size. The division by sectors was made according to their SIC code, including industrial and service sectors. As in other TQM studies, we include different service sectors with different degrees of interaction and adjustment to the customer, and different intensity of labor (Dotchin and Oakland, 1994; Silvestro, 1999). We include different industrial sectors with different degree of complexity of the transaction (De Vasconcellos and Hambrick, 1989), a relevant variable to evaluate the importance of quality in the sector. Within each of these sub-samples, small, medium, and large companies were analyzed. According to European Union criteria (Recommendation of European Commission 96/280/CE) three size segments were defined: small (10–49 workers), medium-sized (50–249 workers) and large companies (250 or more workers).

The fieldwork was carried out during October and December 2000 by means of a structured questionnaire to the CEO or the quality manager in the companies, and 446 valid responses were included in our analysis. All items were measured in a 7-point Likert scale, where 1 represented a very low score and 7 a very high one. According to ARDAN the population was 2695 firms, which considering a confidence level of 95% implies a sample error of $\pm 3.28\%$ ($p = q = 50\%$) for the overall sample. The sample represented a good cross-section in terms of sectors and size. Of the 446 companies 52% belonged to manufacturing, 48% to service sectors. With regard to size, 50% were small firms, 42% medium-sized firms, and 8% large firms. The average number of employees per firm for the whole sample was 93.17 (standard deviation = 219.48). The predominance of small and medium-sized firms is representative of Spanish industry.

4.2. Statistical procedure

The empirical validation of the model was carried out using structural equations modeling (SEM). SEM allows for the introduction of latent variables that can only be measured through observable indicators. In this research, enabler and result excellence, as well as the social and technical dimensions are variables that cannot be directly observed. Moreover, SEM takes into account the existence of measurement error, and offers the possibility of simultaneously estimating all the relationships proposed in the theoretical model, thus attaining a complete representation of the model. SEM is thus a suitable methodology to test in a single model the relationships between enable excellence and TQM dimensions (factorial approach) and the causal relationship between the enable excellence and result excellence (causal approach). We use the statistical software EQS 6.1 (Bentler, 1995), using the maximum likelihood estimation method. To protect our results for possible deviations of normality assumption, all the chi-square values (as well standard errors) reported correspond to Satorra and Bentler (1994) scaled goodness-of-fit test statistics. For the chi-square scaled difference test statistics, we used the Satorra and Bentler (2001) procedure to compute the appropriate value.

4.3. Measures

Following the self-assessment philosophy for the EFQM Excellence Model, each EFQM criterion was operationalized by selecting a set of most relevant items from an original questionnaire about quality practices elaborated by the authors. The initial set of items used to operationalize the EFQM criteria is shown in Appendix A. One hundred and six items were initially selected, 74 to operationalize the 5 enabler criteria and 32 for the result criteria. The items measured quality practices associated to the EFQM criteria and were assigned to each EFQM sub-criterion based on its content domain. An attempt was made to include several items for every sub-criterion to cover the entire set of practices associated to them. However, in some sub-criteria there were not enough items in the questionnaire to reflect the construct accurately, or no possibility of getting a meaningful distinction between sub-criteria. This was particularly important in the case of the “Partnerships and Resources”
and “Processes” criteria, where some sub-criteria were combined (see Appendix A).

Next, to measure the sub-criteria in the enabler domain, items sharing the same sub-criterion were averaged to form composite measures (Landis et al., 2000), also referred to as testlets (Wainer and Kiely, 1987) or item parcels (Bandalos and Finney, 2001). Composite measures are combination of items to create score aggregates that are then subjected to confirmatory factor analyses (CFA) as indicator variables in the scale validation process. In CFA, the use of composite measures is useful by two reasons. Firstly, it enables to better meet the normal-distribution assumption of maximum likelihood estimation. Secondly, it results in more parsimonious models because it reduces the number of variances and covariances to estimate, thus increasing the stability of the parameter estimates, improving the variable-to-sample-size ratio and reducing the impact for sampling error on the estimation process (Bagozzi and Edwards, 1998; Bandalos and Finney, 2001; McCallum et al., 1999; Little et al., 2002). Thus, a composite measure for each sub-criterion was introduced as an indicator variable in the analyses conducted to assess the dimensionality, reliability and validity of the enabler criteria.

By contrast with the enabler criteria, the EFQM Excellence Model comprises only two sub-criteria for each result criterion, named “perception measures” and “performance indicators”. The former refers to information gathered from the organization’s stakeholders (customers, people, society and shareholders), whereas the “performance indicators” are based on self-assessment by the company. As our research design was based on a survey administered to the CEO or quality manager of the company, data from customers, employees or other stakeholders was not available. So, in the result domain, all criteria were considered unidimensional, and the items selected were directly assigned to measuring each criterion and introduced in the CFA as indicator variables. Fig. 2, which represents the structural model proposed, also reflects the way each enabler and result criterion has been measured.

5. Results

5.1. Scale validation

To assure that all criteria had the desirable characteristics of dimensionality, reliability and construct (convergent and discriminant) validity, we conduct several analyses following the procedure recommended by Ahire et al. (1996) and Ahire and Ravichandran (2001).

5.1.1. Dimensionality

Scale dimensionality was assessed by executing a CFA for each criterion. The goodness-of-fit values for the CFA (see Table 4) were all above the recommended values, indicating that all criteria possessed adequate unidimensionality, except for “People Result” ($\chi^2_{14} = 132.13; \text{CFI} = 0.840; \text{RMSEA} = 0.137; \text{BBNFI} = 0.760; \chi^2/\text{d.f.} = 9.4$) and “Key Performance Results” ($\chi^2_{23} = 553.55; \text{CFI} = 0.706; \text{RMSEA} = 0.219; \text{BBNFI} = 0.608; \chi^2/\text{d.f.} = 20.5$) criteria that showed a poor fit. The Lagrange multiplier test (LMTEST) was used to introduce successive modifications in the scales until the fit indices reached values within the recommended limits. As Jöreskog and Sörbom (1996) suggest, only one parameter was altered in each iteration to avoid over-modifying the model. As a result of this process, both the “People Results” and “Key Performance Results” were considered three-dimensional constructs. The three dimensions for the “People Results” criteria were named “People Motivation”, “People Achievement” and “People Satisfaction”; and “Financial Results”, “Results on External Resources”, and “Process Results” in the case of the “Key Performance Results” criterion. Those dimensions follow the proposed structure of the EFQM model when it defines the questions to address in each of these criteria (EFQM, 2003). In addition, 18 items were deleted because they showed low reliability and/or presented significant cross-loadings (the eliminated items are marked with an asterisk in Appendix A). In summary, the dimensionality analysis reflects that 7 of the 9 EFQM Excellence Model’s criteria were unidimensional, and 2 were three-dimensional, and that 88 items (65 for enablers

<table>
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<tr>
<th>Construct</th>
<th>Unidimensionality</th>
<th>Reliability</th>
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<tr>
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<td>Policy and strategy</td>
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<td>People</td>
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<td>Resources</td>
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<td>17</td>
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<td>Process</td>
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<td>Customer results</td>
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<td>People achievement</td>
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<td>People satisfaction</td>
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<td>11</td>
</tr>
<tr>
<td>Results on society</td>
<td>21.941</td>
<td>17</td>
</tr>
<tr>
<td>Financial results</td>
<td>17.763</td>
<td>24</td>
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<tr>
<td>Results on external resources</td>
<td>17.763</td>
<td>24</td>
</tr>
<tr>
<td>Process results</td>
<td>17.763</td>
<td>24</td>
</tr>
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</table>

*a* Satorra–Bentler scaled chi-square (Satorra and Bentler, 1994).

*b* To avoid negative degrees of freedom, a pooled measurement model was executed, with indicators loading on the corresponding criteria (Ahire and Ravichandran, 2001), for those criteria with less than four indicators (i.e., “Partnership and Resources”, “Processes” and “Results on Society”).
and 23 for results) from the 106 initially proposed were retained in the measurement scales.

5.1.2. Reliability
Cronbach’s alpha (Cronbach, 1951) and composite reliability (Fornell and Larcker, 1981) were used to assess the reliability of the scales. Table 4 shows the values of both indices. These are all above the 0.7, except for “People motivation”, which showed reliability coefficients slightly below the threshold. However, as leaving them out would affect the content validity of the model, we decided to retain it.

5.1.3. Convergent validity
Convergent validity was assessed using the Bentler–Bonett normed fit index (BBNFI) (Bentler and Bonett, 1980). BBNFI is the ratio of the difference between the model chi-square for the given model minus the model chi-square for the null model (i.e., the “independence” model in which all of the correlations are zero), divided by model chi-square for the null model. A BBNFI greater than 0.90 indicates strong convergent validity (Ahire et al., 1996). Considering this cut-off value, a high level of convergent validity was found in all criteria, as Table 5 shown.

5.1.4. Discriminant validity
Three approaches were used to assess discriminant validity (Ghiselli et al., 1981; Bagozzi and Phillips, 1982). First, for all scales Cronbach’s alpha was higher than the average interscale correlation (AVISC) (see 4th column in Table 5). Second, the average correlation between the scale and non-scale items (6th column in Table 5) was lower than between the scale and scale items (5th column in Table 5). Finally, for each pair of criteria, we conducted a “pair-wise test” (Bagozzi and Phillips, 1982) to test whether a CFA with two factors fits the data significantly better than a single-factor model; that is, whether each criterion really does represent a different concept. A statistically significant difference between the chi-squared values for the two models (degree of freedom = 1) will enable us to support the existence of discriminant validity. The scaled chi-square difference values (Satorra and Bentler, 2001) for all pairs were found to be statistically significant at 5% level (and hence they are not presented), providing evidence of the existence of discriminant validity.

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Convergent and discriminant validity</th>
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<tr>
<td></td>
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<tr>
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<td>Leadership</td>
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<td>Results on external resources</td>
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<td>Process results</td>
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* Cronbach’s alpha minus AVISC.

Table 6
Means, standard deviations, correlations

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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<th>(10)</th>
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<td>Leadership</td>
<td>0.790</td>
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<tr>
<td>Policy and strategy</td>
<td>0.804</td>
<td>0.766</td>
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<tr>
<td>People</td>
<td>0.724</td>
<td>0.691</td>
<td>0.706</td>
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<tr>
<td>Partnership and resources</td>
<td>0.687</td>
<td>0.693</td>
<td>0.613</td>
<td>0.723</td>
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<tr>
<td>Process</td>
<td>0.544</td>
<td>0.495</td>
<td>0.541</td>
<td>0.533</td>
<td>0.478</td>
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<td></td>
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<tr>
<td>Customer results</td>
<td>0.525</td>
<td>0.421</td>
<td>0.451</td>
<td>0.436</td>
<td>0.442</td>
<td>0.362</td>
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<td>People motivation</td>
<td>0.682</td>
<td>0.534</td>
<td>0.638</td>
<td>0.567</td>
<td>0.513</td>
<td>0.442</td>
<td>0.664</td>
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<td>People achievement</td>
<td>0.469</td>
<td>0.424</td>
<td>0.505</td>
<td>0.452</td>
<td>0.342</td>
<td>0.589</td>
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<tr>
<td>People satisfaction</td>
<td>0.430</td>
<td>0.340</td>
<td>0.411</td>
<td>0.504</td>
<td>0.407</td>
<td>0.523</td>
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<tr>
<td>Society results</td>
<td>0.411</td>
<td>0.344</td>
<td>0.351</td>
<td>0.477</td>
<td>0.460</td>
<td>0.456</td>
<td>0.337</td>
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<tr>
<td>Financial results</td>
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<td>0.393</td>
<td>0.422</td>
<td>0.505</td>
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<td>0.495</td>
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<td>External results</td>
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<td>0.491</td>
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<td>0.529</td>
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<tr>
<td>Processes results</td>
<td>5.789</td>
<td>5.672</td>
<td>5.176</td>
<td>5.192</td>
<td>5.415</td>
<td>5.905</td>
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<td>5.359</td>
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<tr>
<td>Mean</td>
<td>0.688</td>
<td>0.755</td>
<td>1.080</td>
<td>0.960</td>
<td>0.953</td>
<td>0.876</td>
<td>1.166</td>
<td>1.040</td>
<td>1.271</td>
<td>1.279</td>
<td>1.151</td>
<td>1.149</td>
<td>0.963</td>
</tr>
</tbody>
</table>
5.1.5. Descriptive statistics of the validated measurement scales

Table 6 shows the mean, standard deviation and correlations of the 13 unidimensional measurement scales identified in the scale validation process. All correlations were positive and significantly different from zero, a result that is not surprising as the constructs were part of an integrated approach to TQM (Flynn and Saladin, 2001). Giving that the scales were developed using relevant items selected from a common survey, we conducted a Harman’s single-factor test (Podsakoff and Organ, 1986; Podsakoff et al., 2003) to assess whether common method variance exists and to deal with the potential social desirability of the responses. The results of the CFA with the 13 indicators loading into a single-factor ($x^2 (65) = 459.09$, CFI = 0.861; RMSEA = 0.119; BBNFI = 0.842; $x^2$/d.f. = 7.06) showed a poor fit, suggesting that the single-factor does not account for all of the variance in the data.

Finally, in order to reduce the number of parameters to be estimated and to reduce the complexity of the structural model, the 13 constructs were introduced into the structural model as latent factors measured by a single indicator resulting from computing the mean of all items (or composite measures in the case of the enabler domain) for each construct. Reliability coefficients of the seven-unidimensional criteria were introduced in the structural model to correct for attenuation. Fig. 3 shows the multidimensional structural model (MDSM) resulting from the scale validation process.

5.2. Results for the multidimensional structural model

The 13 scales obtained from the scale validation process were used to estimate the multidimensional structural model. In this section, we present the goodness-of-fit indices of the model, followed by a description of the estimated parameters. In the next section, we compare the model with alternative models in which TQM dimensions, enabler excellence and results excellence respectively, are not considered. Finally, we apply the model to the sub-samples of services and manufacturing sectors and compare the results obtained in both samples to test whether there are differences in the EFQM Excellence Model between service and manufacturing firms.

5.2.1. Model fit

First row of Table 7 shows the goodness-of-fit indices of the multidimensional structural model posed in Fig. 3. Several statistics were used to evaluate the goodness-of-fit of the model (Browne and Cudeck, 1993), and the values of all of them show the adequacy of the MDSM for the sample data. These results suggest that the internal structure of the EFQM Excellence Model proposed by the MDSM is thus supported by our data set.

5.2.2. Item-factor loadings

The estimated parameters, standard errors and $t$-tests are shown in Table 8. The first part of Table 8 shows the loadings (\(\lambda\) coefficients) of the enabler and result excellence factors, respectively. In the enabler domain, all loadings are high and statistically significant, ranging from 0.916 for “Leadership”, to 0.825 for the “Process” criterion. Social and technical dimensions also show high loadings (0.987 and 0.932, respectively) indicating that all dimensions and criteria represent the enabler excellence construct to a large degree.

To assess the relationships between the enabler excellence construct and its dimensions, Table 8 shows the coefficient of determination ($R^2$) for every enabler criterion and TQM dimension. The high values indicate that the enabler excellence construct explains a high

![Fig. 3. The multidimensional structural model (MDSM) finally analyzed.](image)
degree of variance in every case. To assess the overall relationship between the enabler excellence construct and the TQM dimensions, we also compute the total (multivariate) coefficient of determination ($R^2_m$), which represents the amount of variance in the set of dependent variables (TQM dimensions) explained by the independent variable (enabler excellence). An $R^2_m$ value of 0.979 indicates that the enabler excellence construct explains almost 98% of the variation of the social and technical dimensions.

The same procedure was applied to evaluate the adequacy of the result excellence construct. Table 8 shows that all loadings are statistically significant, indicating that criteria embody the result excellence construct in high degree. The coefficients of determination for the result criteria (Table 8) show that result excellence construct explains a high percentage of variance in all result criteria except for the “Society Result” (37%). By computing the total coefficient of determination ($R^2_m = 0.710$) we see that the result excellence explains more than 70% of the variance of the result criteria.

### 5.3. Comparison with alternative models

To provide additional evidence of the suitability of the MDSM, it was compared with three alternative models (Shook et al., 2004). Firstly, the MDSM was compared with a model in which enabler excellence is modeled as a unidimensional construct, thus excluding the social and technical dimensions from the model. The comparison between the MDSM and the unidimensional structural model (UDSM) tests whether a model that distinguishes between the social and technical TQM dimensions fits the data better than a model in which these two dimensions do not exist. As UDSM is nested in MDSM, a scaled chi-square difference test was carried out, rejecting the null hypothesis of unidimensionality of the enabler domain ($\Delta \chi^2 = 16.813; \Delta d.f. = 2; p < 0.05$) at 5% level.

Secondly, we also compare the MDSM with a Multivariate Structural Model, MVSM (Edwards, 2001) for the enabler constructs. In this model, all five enabler criteria were treated as a set of exogenous variables with direct effects on the result excellence construct, and the enabler excellence construct and TQM dimensions were absent. Correlations between enabler criteria (the exogenous variables) were also introduced into the model to account for the relationship between the enabler criteria. The comparison between MDSM and MVSM for enablers allows us to test whether the model with the multidimensional construct enabler excellence fits the data better and explains more variance of result excellence than the model in which enabler criteria directly affect the enabler result excellence construct. Results for the MVSM for the enabler domain are reported in Table 7. Although both models have a good fit, the MVSM seems to fit the data better than the multidimensional model, as the goodness-of-fit indices values show. This result is not unexpected, because multivariate models tend to have a better fit than multidimensional models. Multidimensional models comprise dimensions that are necessarily different from one another, and these distinctions are...
expected to relate differently to other variables (Edwards, 2001). Moreover, MDSM is a model more constrained than a multivariate one and, in general, constrained models are inferior in terms of model fit. However, multidimensional models are more parsimonious than multivariate models, and the gain in fit should be weighted against the loss of parsimony. To assess the suitability of the multidimensional models in comparison with the multivariate model, we compute the Parsimony-CFI and the Parsimony-BBNFI (James et al., 1982) for both models (the chi-square difference test can not be used as MDSM and MVSM are not nested models). The parsimony indices compensate for the increase in fit of a less restricted model obtained at the expense of degrees of freedom lost in estimating free parameters (Mulaik et al., 1989). The Parsimony-CFI and the Parsimony-BBNFI were respectively 0.715 and 0.701 for the multidimensional model, and 0.641 and 0.630 for the multivariate model. In addition, when we compare the variance accounted in the result enabler criteria in both models, we see that both models explain the same percentage of variance (0.707 for both models).

Thirdly, the same comparison was applied to the result excellence model. In the MVSM for the result domain, all result criteria were treated as endogenous variables and a direct effect was included, linking the enabler excellence construct to each result criterion, while the results excellence construct was absent. In addition, correlations among residual variances of the result criteria were also introduced. Results for the MVSM for the result domain are reported in Table 7. As in the case of enablers, the MVSM for the result domain seems to fit the data better than the multidimensional model. However, when we compare the goodness-of-fit indices adjusted for parsimony in both models, the MDSM has a better fit (Parsimony adjusted CFI = 0.715 and Parsimony adjusted BBNFI = 0.701) than the MVSM (Parsimony adjusted CFI = 0.630 and Parsimony adjusted BBNFI = 0.630). Moreover, the result excellence variance explained by the multidimensional model is the same that the one explained by the multivariate model (0.707 and 0.710, respectively). In summary, these results show that in our study the multidimensional model is a parsimonious model that represents a satisfactory alternative to the less restricted multivariate models.

5.4. Comparison between manufacturing and service firms

Finally, we conduct a multiple-group analysis to assess whether the same results for the MDSM are obtained across service and manufacturing companies. The goodness-of-fit indices for the multiple-group model (see Table 7) show that this model fits the data well, indicating the existence of configural invariance (Van- denberg and Lance, 2000); that is, the same model could be applied to each sub-sample of manufacturing and service firms.

Table 9 shows the parameter estimates for the service and manufacturing companies. In both samples, social and technical dimensions represent the enabler excellence construct to a high degree, with loadings slightly higher in service firms. In the result domain, the key performance result criterion better represents the result excellence construct, whereas the society result criterion has a lower reliability in both samples. The causal relationship between enabler and result excellence constructs is high and statistically significant in both sub-samples, although this causal effect is greater for service firms (0.858) than for manufacturers (0.816). Overall, the same pattern of interrelationships is observed in both sub-samples, with only minor differences in the estimates.

To test whether differences between services and manufacturing firms are statistically significant, we test the existence of structural invariance. We compare the multiple-group model with a nested model in which the relationship between the enabler and result excellence and the effect of enabler excellence on social and technical dimensions are constrained to be equal across groups. The chi-square difference tests for the multi-group model show that the invariance test is non-statistically significant (Δχ² = 4.748; Δd.f. = 3; p = 0.191). These results indicate that there are no differences between service and manufacturing firms either in the relationship between the enabler and result domain or in the extent to which the social and technical dimensions represent the enabler excellence construct. In summary, the multiple-group analysis shows that the same results are obtained from separate samples and that mixing both types of firms in a single model does not confound the results.

6. Discussion and conclusion

This paper introduces a multidimensional structural model to explore the internal structure of the EFQM Excellence Model in order to analyze this model as an operational framework for TQM. Our model assumes that the EFQM model takes into account the social and technical dimensions of TQM and that effective TQM implementation requires a common (or balanced) approach that manages all the enabler elements in the EFQM model in order to enhance results. The empirical validation of the proposed model for a sample of Spanish firms supports that: (a) the EFQM enablers capture both the technical and social dimension of TQM; (b) both dimensions are interrelated, reflecting the existence of an overall approach to TQM represented by the enabler excellence construct in the MDSM; (c) there is a result excellence construct that underlines the level of deployment obtained by each result criteria; (d) enabler excellence has a strong positive influence on results excellence. The results obtained lead us to conclude that the EFQM Excellence Model reproduces TQM and that a firm could achieve TQM implementation by adopting the EFQM framework. They also reinforce the results obtained in previous studies for the MBNQA. Below, we extend the discussion of these results.

6.1. The EFQM Excellence Model as a TQM framework

The main contribution of this research is to consider the EFQM Excellence Model as an operational framework of
TQM. To be a TQM framework, the internal structure of the EFQM Excellence Model should represent: the social and technical TQM dimensions; the interrelationships between them; and their influence on results.

Following previous studies (Yong and Wilkinson, 2001; Cua et al., 2001; Rahman, 2004) we have distinguished between social (soft) and technical (hard) dimensions, represented in the enabler side of the EFQM Excellence by the Leadership and People criteria for the social dimension, and by Resources and Partnership and Processes criteria for the technical dimension. In studying the dimensionality of the EFQM Excellence Model it was found that, firstly, the variances of social and technical dimensions are statistically significant, indicating that both dimensions are present in the EFQM model. In addition, the comparison between the MDSM with the UDSM shows that social and technical dimensions are necessary in order to adequately reproduce the interrelationships within the enabler domain of the model. This finding confirms that social and technical elements are embedded in the EFQM Excellence Model, providing support to its consideration as a TQM framework. These results converge with those obtained by Curkovic et al. (2000) for the MBNQA when they conclude that MBNQA captures the major dimensions of TQM and that this quality award model is an appropriate framework for a firm to base quality improvement efforts.

Secondly, to reflect the holistic approach that TQM represents, social and technical dimensions should be intercorrelated. In our model, this interrelationship is captured by the enabler excellence construct. The high values of the loading of the enabler excellence on social and technical dimensions (0.987 and 0.932, respectively) indicate that, for the sample of Spanish firms, TQM dimensions are highly interrelated. Moreover, the multidimensional coefficient of determination indicates that the enabler excellence construct explains to a high degree (almost 98%) the variation of the social and technical dimension of TQM. These results confirm previous studies in TQM literature such as Wilkinson et al. (1991) or Snape et al. (1995), when they consider that technical elements related to production issues (such as systematic measurement of processes or performance standards) should be accompanied by an emphasis on human resource activities which shape employees’ attitudes relating to quality. Likewise, the interrelationship between the social and technical dimension supports Dale (1997) assertion that the integration between the social and technical issues of TQM characterizes organizations committed to TQM, and Cua et al. (2001) empirical findings about the complementarities between the TQM technical-oriented practices and the human- and strategic-oriented practices.

Thirdly, the holistic approach of TQM is also shown in the results side of the EFQM Excellence Model, as the excellence results construct explains more than 70% of the variation in results. This finding confirms the results obtained by Reiner (2002) and Calvo-Mora et al. (2005) regarding the existence of an internal logic between the result elements.

Finally, we also find strong evidence of the causal relationship between the enabler and result criteria, according to the TQM assumptions. The high value of the regression coefficient (0.841) and the high proportion of variance of the result excellence explained by the enabler excellence (70%) indicate that enabler criteria must be implemented together to have an effective influence on the result criteria. This assumption coincides with a number of studies on TQM (Belohlav, 1993; Flynn et al., 1994; Nabitz and Klazinga, 1999; Train and Williams, 2000), and reinforces the importance of adopting a holistic view in the EFQM Excellence Model by taking into account all the elements of the model.

| Table 9 | Estimated parameters, standard errors and t-test for the MDSM for multiple-group model |
|---------|---------------------------------|-------------------|-------------------|
| Effect  | Multidimensional structural model for service companies | Multidimensional structural model for manufacturing companies |
|         | Parameter estimates S.E. t-Test | Parameter estimates S.E. t-Test |
| Item-factor loadings | | |
| Enabler Exc. → Social dimension | 0.986 0.043 9.961 | 0.970 0.076 13.977 |
| Enabler Exc. → Technical dimension | 0.952 0.091 12.890 | 0.942 0.090 14.846 |
| Enabler Exc. → Policy and strategy | 0.911 | 0.917 |
| Social dimension → Leadership | 0.860 0.094 14.900 | 0.887 0.065 23.137 |
| Social dimension → People | 0.868 | 0.864 |
| Technical dimension → Partnerships and resources | 0.847 0.064 14.697 | 0.835 0.067 14.922 |
| Technical dimension → Process | 0.751 | 0.787 |
| Result Exc. → Customer results | 0.847 0.159 7.857 | 0.807 0.120 7.484 |
| Result Exc. → People results | 0.556 0.196 6.353 | 0.679 0.100 11.492 |
| Result Exc. → Society results | 0.911 0.146 7.427 | 0.990 0.086 9.300 |
| Result Exc. → Key performance results | 0.858 0.079 9.742 | 0.816 0.110 8.953 |
| Direct causal effects | | |
| Enabler Exc. → Result excellence | 0.644 0.079 9.742 | 0.642 0.110 8.953 |
| Enabler Exc. → Customer results | 0.726 0.192 5.017 | 0.659 0.191 5.962 |
| Enabler Exc. → People results | 0.479 0.210 4.556 | 0.554 0.178 4.977 |
| Enabler Exc. → Society results | 0.781 0.179 5.063 | 0.808 0.177 5.496 |
Our results extend the application of quality award models in several domains. Firstly, this study complements previous research analyzing quality award models, which have focused on both developing measurement models (and its associated constructs and scales) that accurately capture the content of quality award model criteria, and providing insights into the directions of causation among the award’s categories (e.g. Meyer and Collier, 2001; Lee et al., 2003; Badri et al., 2006). As TQM models, the causal relationships between awards criteria should be interpreted not only as empirical regularities within the specific model, but also as substantive relationships in the broader context of TQM research.

Secondly, our results give support to certain authors (e.g. Eskildsen, 1998; Van der Wiele et al., 2000; Westlund, 2001) that have pointed out that the EFQM Excellence Model constitutes an appropriate framework to guide the systematic implementation of TQM. Awards-based frameworks are seen by some authors only as a tool for organizations seeking to be recognized as leaders in the quality management field or as a self-assessment tool. However, our results support the suggestion by Ghobadian and Woo (1996) that they can be used as guidelines for TQM implementation.

Finally, our research matches up with other empirically based TQM research as Flynn et al. (1994), Powell (1995), Black and Porter (1995), Ahire et al. (1996) or Dow et al. (1999) that used quality prescriptions in TQM literature to develop measurement scales to analyze TQM implementation through a set of critical factors. In this sense, the EFQM Excellence Model, as well as other quality award models such MBMQA, provide detailed information through the definition of the criteria, sub-criteria and guidance points that can be useful in the measurement of TQM implementation and in the comparison across countries based on the international acceptance of the quality award models.

6.2. Comparison with the MBNQA Model

Our results rely on the EFQM Excellence Model; however, it would be of interest to compare them with those obtained in previous studies in the MBNQA. In particular, we are interested in comparing the extent to which both models share the main assumptions involved in the TQM concept, such as the following: the distinction between technical and social dimensions, the holistic interpretation of TQM, and the causal linkage between TQM procedures and performance.

Firstly, the holistic interpretation of the TQM is supported by Pannirselvam and Ferguson (2001). Using the MBNQA categories, they found that the MBNQA framework reflects the relationships between the various elements needed by managers to improve organizational performance and proposed that organizations need to broaden their focus from quality control techniques and product design processes to a multifaceted view of TQM. Similarly, for a sample of Korean manufacturing firms, Lee et al. (2003) found that organizational success depends on adopting both primary (i.e., strategic planning and customer and market focus) and supportive (human resources and process management) quality programs. Moreover, they found that enhanced links between leadership and quality systems and between quality information and analysis and quality systems are required. The capability of MBNQA to capture the holistic nature of TQM is also explicitly recognized by Curkovic et al. (2000), proposing that TQM can be conceptualized as a latent factor that captures covariation among the four basic factors that describe the MBNQA framework.

Secondly, although previous studies using the MBNQA have proposed alternative dimensions to capture the constituent parts of TQM, we find certain similarities with the proposal of the existence of a “social” and a “technical” dimension. For example, Pannirselvam and Ferguson (2001) found a strong relationship between leadership, human resource management, and customer focus, results that are consistent with our results for the existence of a “social” dimension. In the same vein, Terziovski and Samson (1999), using the seven categories of the MBNQA to explain operational performance, found a positive relationship between leadership, human resources and customer focus and performance and a non-significant or negative effect of the other categories. Based on these results, they conclude that: “It is interesting that the strong predictors of performance were the so-called ‘soft’ factors of leadership, human resource management and customer focus” (p. 403).

Finally, the positive influence of the enabler on results criteria is also supported by most of the studies that have analyzed the MBNQA (e.g. Wilson and Collier, 2000; Flynn and Saladin, 2001; Pannirselvam and Ferguson, 2001; Ghosh et al., 2003; Lee et al., 2003). All these authors report the existence of significant relationships among the Baldrige categories and emphasize the adequacy of the MBNQA to confirm the relationship between TQM practices and performance.

6.3. A global approach to studying the internal structure of the EFQM Excellence Model

From a methodological point of view, we have adopted a global approach to analyzing the internal structure of the EFQM Excellence Model that combines the factorial and causal approaches adopted in previous studies. In our model, the interrelationships between the criteria in each domain – enabler and result – are explained by the latent factors enabler and result excellence, which measure the degree of excellence reached by an organization in the management of the enabler and result criteria respectively. The causal effect of enablers on results is summarized in a single coefficient that relates enabler excellence and result excellence. Our approach is thus in accordance with Dijkstra (1997) who asserts that there is a latent factor that underlies the model’s criteria, as well as with other studies (e.g. Winn and Cameron, 1998; Wilson and Collier, 2000; Calvo-Mora et al., 2005) which have found the existence of causal relationships between awards criteria. We therefore complement the causal and factorial approaches used in previous studies to analyze the internal structure of the EFQM Excellence Model. Within this
approach, the assimilation and the commitment of a firm to the TQM core concepts will determine the behavior of the organization (i.e., the degree of excellence reached by the organization), that will be reflected in the criteria of the EFQM Excellence Model.

Our global approach provides some other interesting benefits for testing the EFQM Excellence Model. The latent enabler and result excellence constructs helps to explain the way in which TQM is implemented in organizations, providing information about the degree of deployment of each enabler criterion. For example, for the sample of Spanish firms, our results indicate that the enabler excellence construct is reflected to a greater degree by the criteria related to social dimension than for the technical dimension. In the result domain, Society results is the criterion which shows a lesser relationship with the result excellence construct. This means that, although we advocate the analysis of enablers as a whole system and the consideration of the commonality between all the dimensions in producing results, there are differences between enablers and result criteria in the degree in which enabler and result excellence is manifested.

Finally, although previous studies have also adopted a factorial approach to analyzing the award-based frameworks (Curkovic et al., 2000; Dijkstra, 1997; Bou-Llusar et al., 2005), our methodological approach extends these studies by considering both a factorial and causal approach. In this sense, our study extends Dijkstra’s approach, analyzing not only the enabler side of the EFQM Excellence Model but also the results domain. Curkovic et al. (2000) create a common factor named TQM that capture the relationship between four constructs of the MBNQA (TQM strategy system, TQM operations systems, TQM informational systems, TQM results). While they already include results in their TQM factor, we extend their approach by analyzing the causal effect of enablers on results in the EFQM Excellence Model. In addition, our paper enhances the study by Bou-Llusar et al. (2005) by considering both technical and social TQM dimensions in the interpretation of the enabler latent factor.

6.4. Implications

Our results are also interesting for managers who are applying the EFQM Excellence Model to improve quality in their businesses and to guide the implementation of TQM, and for researchers interested in the study of the operational frameworks for TQM. As Sila and Ebrahimpour (2002) state, in the absence of a universally accepted TQM model, many firms put their faith in quality award models and use them as guidelines. The understanding of the internal structure of the EFQM Excellence Model in our study facilitates the guiding role that award-based models play in the implementation of TQM systems. This role will be promoted with a greater comprehension of the linkages between the elements that compose the models. Thus, as Eskildsen and Dahlgard (2000) and Reiner (2002) state, knowledge about the structure of the model allows organizations to benefit fully from the self-assessment processes and to improve the management of the business. In addition, according to Rusjan (2005), the analysis of the relationships between the model criteria complements the guidelines included in the model in order to exploit the strengths and to prioritize areas for improvement in organizations.

Along these lines, managers can use our conclusions to diagnose their TQM status and develop actions plans. The empirical validation of our model suggests practitioners should take on a systemic approach in the use of the EFQM Excellence Model to implement a TQM initiative. Managers must balance the social and technical practices in the context of a TQM initiative as efforts concentrated on one or a few issues would be less effective. As Curkovic et al. (2000) suggest, social and technical dimensions are needed to have a complete TQM system, and managers should focus on these both critical drivers of performance.

In addition, the systemic approach implies that managers need to be committed to TQM core concepts in order to take advantage of the practices considered in the EFQM criteria. A general commitment to and acceptance of TQM principles is essential in order to benefit from the application of EFQM criteria. Otherwise managers would have only a collection of unrelated and incoherent practices.

Finally, our results suggest some opportunities for developing the EFQM Excellence Model, for example by grouping the social and technical criteria. The approach we have used to operationalize EFQM criteria could also be applied to other constructs in operations management which, like TQM, could be considered as latent and multidimensional in the existing literature.

6.5. Limitations and future research

As in other empirical studies, the findings and implications in this study should be interpreted with caution, due to their limitations. Firstly, in our study the model was developed and tested using the same data set. Although the model is suitable for both service and manufacturing firms, and the results obtained remain stable across sub-samples, the application of the model to other data will help to validate our results and to assess its generality in other contexts.

Secondly, we use perceptual data to measure the EFQM criteria and it is worth recognizing the possibility that the perceptions of those surveyed do not provide a completely accurate view of reality. So, a logical extension would be to use multiple informants to verify perceptions. Also, the study has focused on a generic SEM, while there may be cross-country differences in this respect (Prasad and Tata, 2003; Rungtusanatham et al., 2003; Flynn and Saladin, 2006). For example, Flynn and Saladin (2006) have reported evidence about the strong role that national culture plays in the effectiveness of the MBNQA, and the need for countries to adapt quality initiatives to their national cultures. A natural extension of this paper would be to analyze the existence of differences between countries in the EFQM Excellence Model.
Appendix A. Original scales for measuring the EFQM criteria

1. Leadership
1a. Leaders develop the mission, vision, values and ethics and are role models for a culture of Excellence
   Managers encourage employee empowerment and autonomy
   Managers participate and give support to continuous improvement processes
   Managers collaborate in quality training by teaching people at lower hierarchical levels
   Managers ensure that all members of the company have a clear idea of what the company's position in the market should be
1b. Leaders are personally involved in ensuring the organization's management system is developed, implemented and continuously improved
   Managers become involved in running the company as a set of interrelated processes, all of them responsible for quality
   Managers ensure that employees are capable of taking initiatives and assimilating better ways of doing their jobs
1c. Leaders interact with customers, partners and representatives of society
   Managers take part in continuous improvement processes, even when these activities go beyond managerial responsibilities
   Satisfaction of current and future customers ensures the competitive success of the company
   To improve in a particular aspect, we collaborate with other companies to help us with the improvement
1d. Leaders reinforce a culture of excellence with the organization's people
   There is a strong communicative culture throughout all areas of the organization
   The involvement of workers can only be achieved if managers are the first to show commitment, practicing what they preach
   Managers behave in a way that allows the integration and mobilization of members of a team
1e. Leaders identify and champion organizational change
   Continuous improvement and change are necessary even when good results are being obtained
   Managers stimulate the continuous improvement of products and processes
   Managers continuously acquire and update knowledge that is valuable for the organization
   Managers act in a way that makes it easier for employees to accept proposed changes voluntarily

2. Policy and strategy
2a. Policy and strategy are based on the present and future needs and expectations of stakeholders
   The establishment of organizational objectives takes into account employee opinions
   The establishment of organizational objectives takes into account external opinions
   Effective management is based on information about customers
   Customers' needs are taken into account when establishing objectives
2b. Policy and strategy are based on information from performance measurement, research, learning and external related activities
   Continuous improvement processes are based on a systematic assessment of organizational effectiveness
   Benchmarking techniques are used to establish improvement standards and objectives
   Systematic measurement of quality and non-quality costs is carried out
   Self-assessment processes take place on a regular basis
   Information systems are in place to capture external information (about customers and markets)
2c. Policy and Strategy are developed, reviewed and updated
   Systematic procedures are in place to plan, evaluate and control organizational goal achievements
   Quality strategies affect all organizational areas and managerial activities
   Quality objectives stem from long-term strategic plans
   The organization has formal strategic plans
   Managers favor consensus about relevant objectives and future projects
2d. Policy and Strategy are communicated and deployed through a framework of key processes
   Organizational processes and their interrelationships are identified
   Quality policies are translated into a set of specific and measurable objectives
   Managers inform employees about the quality strategy
   Every member in the organization knows the organizational mission and objectives

3. People
3a. People resources are planned, managed and improved
   Formal processes are used (such as attitude surveys or employee briefing) to find out employee opinions
   Emphasis is placed on recruiting highly skilled employees
3b. People's knowledge and competences are identified, developed and sustained
   Specific quality training is offered to employees
   Employees continuously update their skills in their specific area of knowledge
   Extensive training means are provided for employees
3c. People are involved and empowered
   Employees are allowed to decide how the work is done
   Employee opinions are taken into account when defining organizational objectives
   Employees are given the opportunity to suggest and implement solutions to work problems
   Employee autonomy and participation is encouraged
   Teamwork is common practice
3d. People and the organization have a dialogue
   Formal communication channels are in place to provide organizational areas with information about customers' needs
   Formal communication procedures are established with staff, customers and suppliers
Appendix A (Continued)

Employees have access to information about quality results
Employees maintain fluid communication with one another, going beyond the formal structure of the organization
Employees have worked together for a long time, which facilitates good co-ordination between them
Internal communication is totally open and transparent
Employees voluntarily pass on useful information between one another

3e. People are rewarded, recognized and cared for
Managers explicitly recognize employees' achievements at work

4. Partnerships and resources
4a. External partnerships are managed
Quality agreements with suppliers are established
Relationships with customers and suppliers allow the organization to have rapid access to information about new products and technology
The organization has a high capacity for external cooperation

4b, 4c, 4d, 4e. Internal resources
4b. Finances are managed
4c. Buildings, equipment and materials are managed
4d. Technology is managed
4e. Information and knowledge are managed

Policy and strategy guides the definition of operative and financial objectives
Inventory levels are high
Intensive efforts are made to guarantee high quality raw materials
Frequent technological innovations are implemented
Efforts are made to know what the workforce needs in terms of information and resources

5. Processes
5a. Processes are systematically designed and managed
Work methods and organizational process are explicitly defined
There is comprehensive documentation about work methods and organizational processes
Quality manuals and organizational processes are periodically revised
Systems of indicators are in place to revise changes in processes
Work processes exist that promote efficient behavior patterns throughout the organization

5b. Processes are improved, as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders
Development and innovation of production processes is emphasized

5c, 5d, 5e. Products and Services are designed, developed, produced and delivered based on customers' needs
5c. Products and Services are designed and developed based on customer needs and expectations
5d. Products and Services are produced, delivered and serviced
5e. Customer relationships are managed and enhanced

The organization knows which products and services customers need
The organization is oriented towards the fulfillment of customers' expectations and needs
Product design provides customers with high utility
The organization is able to develop new products or services ahead of competitors
The products' valuable features are superior to those of competitors
Standardized systems are in place to deal with customer complaints
Marketing techniques and methods are developed

6. Customer results
Customer satisfaction has improved
Customer consolidation has improved
Communication with customers has improved
Customer complaints have decreased
Services offered to customers are better than competitors

7. People results
V7a. Employee motivation and commitment
Employee willingness to work extra time has improved
High employee organizational commitment has improved

V7b. Employee achievement
Employees identify and provide solutions to work problems
Employees share organizational values
Employees show high levels of initiative

V7c. Employee satisfaction
Employee absenteeism has decreased
Employee turnover has decreased
Employee opinions contribute to improving work performance
Employees have high levels of know-how
Communication with employees has improved
developed. The “Process” criterion was formed by three sub-criteria: 5a, 5b, and the combined sub-criterion 5c, 5d, 5e called “Policy and strategy and the effective operation of processes” (italics added).

8. Society results
Protection of environment has improved
Noise levels have decreased
Pollution levels have decreased
The organization has a positive impact in society*

9. Key performance results
V9a. Financial results
Market share has improved
Sales per employee have improved
Profit levels have improved
There has been a noticeable improvement in financial results*

V9b. External results
The number of suppliers has decreased
Quality of raw materials has improved
Relationships with suppliers have improved
Supplier management has improved
V9c. Results on processes
Process efficiency has improved
Knowledge about efficient operation management has improved
Recorded time has improved*

Note: The scale for measuring “Partnership and Resources” criteria was composed of two sub-criteria: “External partnerships” (sub-criterion 4a), and a combined sub-criterion (4b, 4c, 4d and 4e) called “Internal resources”. This two-dimensional proposal is in accordance with the “Partnership and Resources” EFQM criterion definition: “Excellent organizations plan and manage External Partnerships, suppliers and Internal Resources in order to support policy and strategy and the effective operation of processes” (italics added).

The “Process” criterion was formed by three sub-criteria: 5a, 5b, and the combined sub-criterion 5c, 5d, 5e called “Products and Services are designed, developed, produced and serviced based on customer needs”.

References


