TQM and firms performance: An EFQM excellence model research based survey

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Abstract

The purpose of this article is to develop an instrument for measuring TQM implementation following the European Foundation for Quality Management Excellence Model and to provide empirical evidence on the relationship between management practices and measures of business performance in the model. To this end, the study employs survey data collected from Spanish manufacturing and service firms. Confirmatory factor analysis is used to test the psychometric properties of the measurement scales and the hypothesized relationships between total quality management practices and organizational performance are examined using structural equation modeling. The findings of the research indicate that the adoption of the TQM practices suggested in the EFQM Excellence Model allows firms to outperform their competitors in the results criteria included in the Model. Therefore, this paper provides a valuable benchmarking data for firms as it substantiates the EFQM Enabler's contribution to the attainment of competitive advantage.

Keywords: total quality management, business performance, competitive advantage, EFQM excellence model, Spain

1 INTRODUCTION

Since the 1980s, when the total quality management (TQM) concept was firstly defined (Deming, 1986, Crosby, 1979, Juran, 1986), practitioners and researchers alike have broadly defended the positive effects of TQM practices on firms' overall effectiveness and performance. However, although TQM has been clearly conceptualized around basic principles such as consumer focus, continuous improvement and human resource management, there has been a lack of consensus regarding its primary constructs, which prevents comparison across studies and generalizations from the empirical evidence. The 90s mark the starting point of empirical research on critical factors in TQM, although different studies have yielded different sets of TQM factors (Saraph *et al.*, 1989; Flynn *et al.*, 1994; Powell, 1995; Ahire *et al.*, 1996; Black and Porter, 1996; Zhang *et al.*, 2000; Antony *et al.*, 2002). As a result, there is no single measurement instrument to evaluate TQM implementation.

Furthermore, evidence concerning the impact of TQM on business performance is also based on a wide range of indicators that differ across studies and are in some cases contradictory, especially regarding financial performance, which is measured in terms of ROA –return on assets- or ROI –return on investment. Some research has found a positive effect of TQM on the latter (Easton and Jarrell, 1998; Hendricks and Singhal, 2001a,b); whereas other research reports a negative incidence of TQM on these measures (Chapman *et al.*, 1997). In some cases, TQM's repercussion on these financial outcomes is even deemed inexistent (Adam, 1994; Powell, 1995; York and Miree, 2004). The different methodological and conceptual approaches used by researchers may have led to conflicting results but, in response to this controversial evidence, a new body of research is examining a contingent approach to the TQM-performance relationship. This approach assumes that the effects of TQM on business results are mediated by both non-controllable environmental factors, such as market competitiveness, uncertainty or complexity (Fuentes, 2003; Chong and Rundus, 2004), and by internal factors, such as how long TQM has been implemented, or the firms' size, diversification or capital intensity (Terziovski and Samson, 1999; Hendricks and Singhal, 2001a; Brah *et al.*, 2002; Lloréns *et al.*, 2003; Taylor and Wright, 2003).

Obtaining sound evidence of TQM's impact on performance in different contexts should be as much a priority as addressing the potential moderators of this link. TQM is one of the most complex activities that any company can involve itself in; it requires implementing a new way of managing business and a new working culture which not only affect the whole organizational process and all employees but also demand the allocation of significant organizational resources. Firms therefore need to be fully convinced of the trade-offs provided by TQM, particularly if time elapses before the desired results are felt, or if substantial organization stress has to be overcome in the short term to adopt the necessary organizational change (Brah *et al.*, 2002). However, most research undertaken so far relates to companies operating in developed countries, mainly USA, UK and Australia (Sila and Ebramhimpour, 2002), although some researchers have focused on developing economies such as India (Motwani *et al.*, 1997, Rao *et al.*, 1997), Saudi Arabia (Curry and Kadasah, 2002) and Palestine (Baidoun, 2004).

To reinforce the benefits of TQM it is also advisable to facilitate comparison across studies by avoiding differing conceptualizations and TQM-related measures. Accordingly, it has recently become a common practice to link research to the criteria of well-known Quality Award models (Woon, 2000; Rahman, 2001; Prajogo and Sohal, 2004). Quality Awards provide a useful assessment framework against which organisations can evaluate their quality management practices and their end business results, and constitute a common benchmark or standard criteria for firms operating under their area of influence. We advocate the use of these models as a TQM benchmark in their respective geographical area of influence (i.e. countries), as they offer firms several advantages, including the immediate chance to assess their closest competitors' TQM practices and the outcomes that may be expected. Consequently, the aim of this study is to develop an instrument to measure TQM implementation based on Quality Award applicable to the Spanish firms under study, i.e., the European Foundation for Quality Management (EFQM) Excellence Model, as well as to provide empirical evidence on the relationship between management practices and measures of business performance in the model.

The body of literature that analyzes the relationship between quality management and organizational performance resorting to quantitative data analysis, and adopting a comprehensive analysis of the EFQM quality practices and outcomes, is limited. The list becomes even shorter if we seek this analysis based on causal relationships and referred to business organizations (Bou-Llusar *et al.*, 2005; Eskildsen and Dahlgaard, 2000). Given that this model represents the European standard to be achieved by firms involved in the TQM adventure, this study seeks to fill a gap in the literature by employing structural equations modelling (SEM) to test the criteria relationships. Our end purpose is to substantiate TQM's contribution to the attainment of competitive advantage, that is, the

outperformance of competition as measured by the results criteria included in the EFQM Excellence Model.

The paper is structured as follows. We firstly review the TQM literature and the EFQM Excellence Model and describe the opportunities derived from the use of this framework as a guide to developing a TQM measurement instrument. The next section covers the methodology followed in the research, including details of how the measure instrument was constructed, the sample obtained and the research method employed. Thirdly, we address the evaluation of the scale's psychometric properties: namely, its reliability, validity of content, convergent validity and discriminant validity. Finally the causal model is tested, providing evidence on TQM outcomes.

2 LITERATURE REVIEW

TQM measurement

The literature's failure to provide a single, systems approach to TQM implementation is illustrated by Sila and Ebramhimpour (2002), who undertake a useful revision of the TQM survey-based research published in English between 1989 and 2000 - a total of 347 articles - and identify up to 25 TQM factors *most commonly* extracted from the 76 empirical studies that adopted an integrated or holistic view of TQM. They also offer a variety of reasons that may justify the appearance of different sets of TQM factors, mainly:

1) Differences in the conceptual approaches taken by researchers.

2) Differences in the empirical methodology followed: some studies use confirmatory factor analysis to verify the underlying factors of TQM (Wilson and Collier, 2000; Kaynak, 2003; Fuentes *et al.*, 2004), although most research basically employs factor analysis (FA).

3) Differences between countries' business, socio-political and socioeconomic environments (i.e. culture, education levels, information technology, government regulations, level of industrialization) that would prevent straightforward transferability and applicability of TQM concepts, principles, and practices (Sila and Ebramhimpour, 2002). This raises the question of the universal applicability of TQM (universalism), which has recently received the attention of several scholars (Newman and Nollen, 1996; Roney, 1997; Rungtusanatham *et al.*, 2005). In short, further research is still needed to determine whether TQM management practices and principles can transcend organizational and national boundaries or whether this concept can be subject to different interpretations in different environments.

In efforts to measure TQM world-wide, several Quality Awards have been used to guide research into TQM. These awards synthesize the common understanding of TQM practices for the firms operating under their area of influence. The most popular of them has been the Malcolm Baldrige National Quality Award (MBNQA) in USA (Black and Porter, 1996; Rao *et al.*, 1999; Samson and Terziovsky, 1999; Wilson and Collier, 2000; Pannirselvam and Ferguson, 2001; Prajogo and Sohal, 2004); although the Australian Business Excellence framework (ABE) (Rahman, 2001) and the Singapore Quality Award (Quazi and Padibjo, 1998; Woon, 2000) have also inspired several studies. This research is based in the EFQM Excellence Model, which is described in the following section together with a justification of its applicability to identifying TQM constructs.

The EFQM Model

The EFQM Excellence Model was introduced at the beginning of 1992 as the framework for assessing organisations for the European Quality Award. It is now the most widely used organisational framework in Europe (Eskildsen and Dahlgaard, 2000) and has become the basis for the majority of national and regional Quality Awards. The EFQM Excellence Model is a non-prescriptive framework based on 9 criteria as shown in Figure 1. Five of these are *"Enablers'* (leadership, people, policy strategy, partnership & resources, and processes) and four are 'Results' (people results, customer results, impact on society results and business results). The 'Enabler' criteria cover what an organisation does. The 'Results' criteria cover what an organisation achieves. 'Results' are brought about by 'Enablers', and 'Enablers' are improved using feedback from 'Results'. The Model, which acknowledges that there are many approaches to achieving sustainable excellence in all aspects of performance, is based on the premise that:

Excellent results with respect to Performance, Customers, People and Society are achieved through Leadership driving Policy and Strategy that is delivered through People, Partnerships and Resources, and Processes (EFQM, 2002).

Figure 1: EFQM Excellence Model
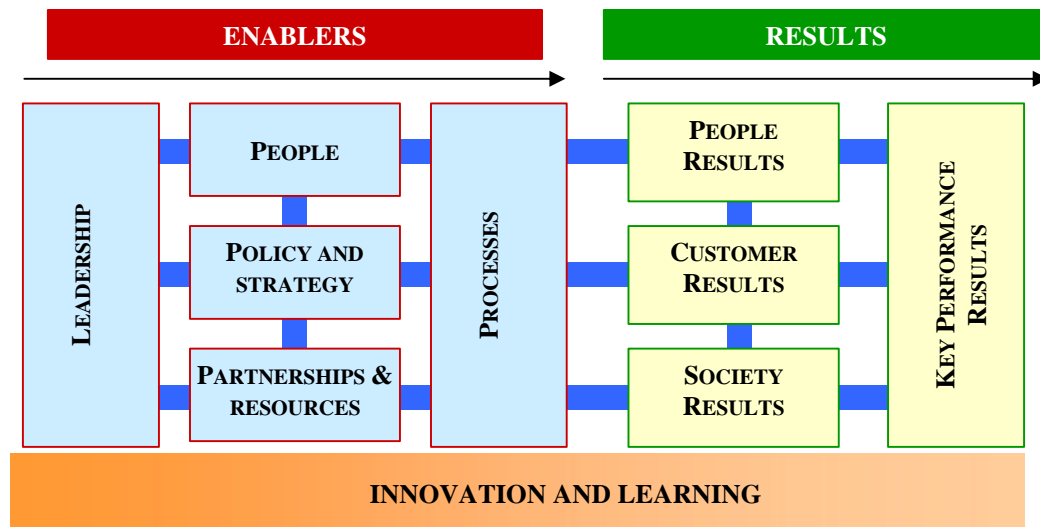
The EFQM Excellence Model is a practical tool that offers several advantages from the empirical research perspective, as do other Quality Awards:

- The model is regularly revised and updated, incorporating the contributions of EFQM consultants. Therefore, the set of constructs underlying the model is not limited to a single researcher's view of TQM, which also guarantees its comprehensiveness, dynamism and tracking of the latest developments in TQM.
- It provides an extensive set of sub-criteria to detail the exact meaning of each criterion. This facilitates the items' identification in the scale development.
- Additionally, award models are intended to be instruments for comparing an organisation with its competitors in order to achieve and/or maintain competitive advantage. When survey data based on these models is provided to the firms, the self-assessment of TQM implementation and the identification of areas for improvement in relation to the firm's closest competitors is substantially facilitated, which increases the practical implications of the research. The EFQM Excellence Model has obvious prestige among European firms as a sound quality standard and there is an ever-increasing number of firms involved in the recognition process to achieve the European Quality Award (EQA) (EFQM, 2006). As this happens, the benchmarking utility of the model increases.
- In the case of the EFQM Excellence Model, the increasing convergence of European markets dissipates any concern regarding the universalism issue. Therefore, empirical evidence relative to the effects on performance of TQM practices according to this model acquires great relevance for all firms competing in the European Union.

Previous research based on the EFQM Excellence Model has been devoted, in many cases, to conceptual developments or reflections on the application of the EFQM model (Cragg, 2005; Martín-Castilla, 2002; Rusjan, 2005; Westlund, 2001; Wongrassamee *et al.*, 2003). Thus, researchers have addressed, for example, the problems associated with the self-assessment methodology used by the EFQM Excellence Model (Samuelson and Nilsson, 2002; Li and Yang, 2003), or the usefulness of the EFQM model to identify organizations' most representative resources and capabilities, that is, their basis for competitive advantage according to the resource-based view of the firm theory (Castresana and Fernandez-Ortiz, 2005). Several papers have also been dedicated to case studies specially within the education (Farrar, 2000; Hides, *et al.*, 2004; Tarí, 2006) and health care sectors (Jackson, 2000; Jackson and Bircher, 2002; Moeller *et al.*, 2000; Stewart, 2003). The literature also provides several research papers on the EFQM Excellence Model (i.e., papers based on quantitative research and that resort to multivariable analysis techniques), although these have not always adopted a holistic view of quality practices (Eskildsen and Dahlgaard, 2000; McCarthy and Greatbanks, 2006; Osseo-Asare *et al.*, 2005). Among the research papers that analyze the full set of relevant dimensions in the EFQM Excellence Model (Bou-Llusar *et al.*, 2005; Calvo-Mora *et al.*, 2005; Eskildsen *et al.*, 2001; Moller and Sonntag, 2001) the employment of methodologies that allow evaluating causal relationships between

Enablers and Results, namely Structural Equations Modeling (SEM), is more scarce (Bou-Llusar *et al*., 2005).

In this context, our empirical work seeks to validate the nine criteria of the EFQM Excellence Model as constructs. To this end the paper provides an exhaustive analysis of the psychometric properties of the scales employed. The scale validation effort is important to assure the quality of the measure instruments or their ability to provide a sound and accurate measure of the concepts in the research model. The research also aims to determine the impact of the Enabler criteria on the Results predicted in the EFQM Model using SEM, that is, evaluating the notion of causality. Therefore, we give the "Results" constructs a separate status in our study as the dependent variables influenced by the TQM practices followed by organizations. This same approach has been followed by Samson and Terziovski (1999), who relate their investigation to the MBNQA criteria, and by Rahman (2001) who conceptualizes TQM using the Australian Business Excellence (ABE) framework as a guide. Thus, the following hypothesis is formulated:

H1: TQM practices according to the EFQM Excellence Model directly and positively influence organizational performance in the Results criteria shown in the Model.

Among the outcomes of TQM practices, the Key Performance Results category includes a wide variety of different types of performance indicators. In this study, we have selected those most consistently incorporated into previous research (Kaynak, 2003), namely financial performance, supplier support, process efficiency and cost reductions. The model to be tested is shown in Figure 2.

Figure 2: Research Model
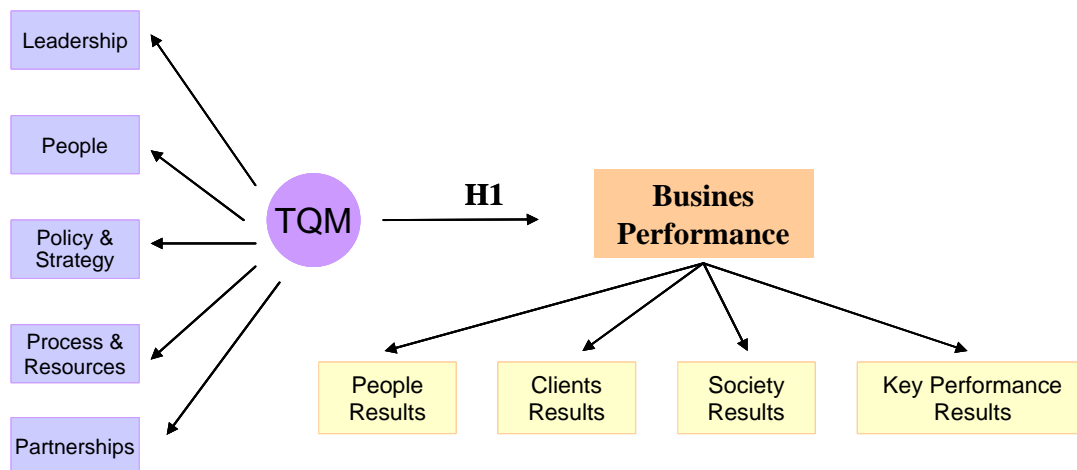
3 RESEARCH METHODOLOGY

Instrument development

There are several sub-criteria under each EFQM criterion that describe aspects of the criterion in more detail. These sub-criteria were used as a guide, as was previous empirical research on factors critical to TQM based on a holistic approach to this concept (Saraph et al., 1989, Flynn et al. (1994), Anderson et al. (1995), Badri et al., (1995), Powell (1995), Ahire et al. (1996), Black and Porter (1996), Ahire and O'Shaughnessy (1998), Grandolz and Gershon (1998), Quazi and Padibjo (1998), Anderson and Sohal (1999), Samson and Terkiovski (1999), Zhang et al. (2000), Antony et al. (2002) and Brah et al. (2002)). Many critical factors obtained in previous research not only show a clear correspondence with the EFQM criteria, but also the items that comprise have come through a validation process, which fully justifies using them in this study. A review of the literature and the EFQM Excellence Model provided over one hundred items from amongst the nine criteria. The different statements were evaluated to avoid duplications and the list was reduced to 81 items. The process entailed careful monitoring to ensure comprehensive coverage of the TQM concept. With statements for all the nine criteria completed, the questionnaire was pilot-tested using six respondents from the regional Quality Club Managerial Board. All the informants were the CEOs of each firm and their corresponding

companies were not included in the random sample. The researchers undertook personal interviews of an average length of 90 minutes to carefully review the questionnaire. The interviewees have considerable managerial experience to examine the questions and they provided a valuable opinion about their readability, adequacy to the TQM measurement and correct understanding. As a result, several items were rewritten to facilitate their interpretation, to avoid confusion and thus prevent research bias. The items finally employed are listed and classified according to their main dimensions as shown in Appendix 1. Following Ahire and O'Shaughnessy (1998), a seven-point Likert scale was used for all items to ensure higher statistical variability among survey responses. Thus, for each TQM Enabler criterion, respondents evaluated how well the different statements described their companies practices on a scale from 1 ("strongly disagree") to 7 ("strongly agree"). In order to isolate TQM effects on performance and avoid confusion with other exogenous or endogenous factors, respondents were asked to evaluate the extent to which the sole contribution of these practices had led to the achievement of each of the performance indicators (1="not at all"; 7="a great deal"). That is, respondents are asked to indicate to what extent their firm's quality practices allow to achieve the evaluated variables of performance. This procedure does not "invoke" causality but rather avoids the TQM-performance relationship to be interfered either by uncontrollable variables or other organizational processes that can affect performance. In addition, performance was evaluated against the firms' main competitors to introduce an explicit reference to the attainment of competitive advantages (Weerawardena, 2003a and b; Chong and Rundus 2004; Prajogo and Sohal, 2006). The reference to the major competitor in the industry allows both minimising the industry effect and decreasing the response's subjectivity establishing a point of reference to make the comparison (Kraft, 1990); likewise, this fact allows assessing the achievement of competitive advantages in the matter in the period under consideration (Grant, 1991). The research seeks to establish whether the TQM practices suggested in the EFQM Excellence Model allows firms to outperform their competitors and can be considered a feasible path towards building competitive advantage. Therefore, in most cases performance was evaluated by the firms' CEOs, and the respondents selected their firm's main competitor according to their perceptual judgements. Total quality oriented firms can be presumed to have a strong market orientation which provides them with a reasonable knowledge of their clients and competitors' operations (Yam *et al.*, 2005).

While perceptual judgements have a potential for self-reporting bias, prior research has also shown that perceived performance can be a reasonable substitute for objective measures and that managers prefer to avoid offering precise quantitative data (Taylor and Wright, 2003; Fuentes *et al.*, 2004)

Sample and research method

Data for empirical testing and validating the TQM scale was obtained by means of a mail survey. The research population consisted of all the ISO 9000 registered firms in the Principality of Asturias, a total of 451 organizations according to the data provided by the Regional Quality Club. Certified firms were selected to guarantee a certain interest in quality management practices as well as familiarity with the issues addressed in the questionnaire (Curry and Kadasah, 2002). Similarly, ISO 9000 implementation may be seen as a stepping-stone towards TQM (Antony *et al.*, 2002). The questionnaire was mailed to the General Manager or Managing Director of each organization to ensure a good knowledge of the firms' TQM practices and outcomes in relation to their competence. Thus, it is essential to guarantee that the survey's respondents do possess the knowledge required to answer the questions appropriately (Agus, 2000; Taylor and Wright, 2003; Weerawardena, 2003b). The questionnaire delivery included a cover letter and a pre-paid return envelope. The covering letter outlined the objectives and importance of the study, was signed by the President of the Regional Quality Club and included an assurance of confidentiality. The study was conducted between January and March of 2005. Telephone calls were made three weeks after the start to follow-up the study and another copy of the questionnaire was sent to several organizations when required. A final response rate of 20.6% was obtained, representing 93 firms from a range of manufacturing and service sectors. The proportion of respondents was equally distributed between manufacturing and non-manufacturing sectors (41.8 % and 58.2% respectively). The majority of the respondents (78.5%) were senior managers (General Manager or Managing Director), so they had the knowledge to answer the questions appropriately. Approximately, 8.4% of the firms had less than 10 employees, 44.6% had between 10 and 49 employees, 37% employed between 50 and 249 workers, and 10% had more than 250 employees.

4 PSYCHOMETRIC PROPERTIES OF MEASUREMENT SCALES

The psychometric properties of the measurement scales were assessed in accordance with accepted practices (Gerbing and Anderson, 1988) and included the establishment of content validity, reliability, convergent validity, discriminant validity and criterion-related validity. The scales validation involved both exploratory and confirmatory factor analysis using SPSS12.0 and EQS6.0 software respectively.

Reliability - stage one

The reliability of an instrument assesses its ability to yield the same results on repeated trials. Internal consistency is one of the methods that can be used for assessing reliability (Nunnally, 1978). It indicates how well the different items of a scale measure the same concept and it is generally measured by means of a reliability coefficient such as Cronbach's coefficient alpha. Cronbach's alpha was calculated separately for each of the constructs, with item-to-total scale correlations being plotting. Generally, reliability coefficients of 0.70 or more are considered good and it is advisable to eliminate those items that diminish the coefficient value. The results in Table 1 show that the values of Cronbach's alpha derived for the constructs ranged between 0.773 and 0.951, indicating a high reliability of the scales. Ten items were deleted after the reliability analysis shown in italics in Appendix 1.

At this point in our research we had still not checked for possible item overlap across the dimensions of both TQM practices and results. We therefore undertook a principal components analysis with varimax rotation for each set of Enabler and Result variables. A factor loading of 0.50 was used as the cut-off point. The results show that the statements corresponding to the same dimension load on a single factor, with the only exception of some items relating to resources management from the Partnership and Resources criterion (Part&res5 to Part&res8). These items load on the Processes factor. This fact is not conceptually surprising, given that resources management involves the development of certain organizational processes. For this reason, a new factor, labelled Processes and Resources, is considered in further CFA, while the partnership and resources criterion is subsequently referred to as Partnership. Additionally, it is noteworthy that none of the variables failed to meet the cut-off point considered; nor were there cross loads among factors.

Validity

Validity refers to the degree to which a measure accurately represents what it is intended to measure. Three different types of validity are generally considered: content validity, convergent and discriminant validity, and criterion-related validity (Nunnally, 1978).

Content validity

Content validity represents the extent to which a specific content domain is reflected by an empirical measure. Unlike the other validity analyses, content validity is not evaluated numerically. Researchers must ensure that the survey addresses all issues relevant to the content domain under study in order to guarantee content validity. The scales for measuring TQM practices and outcomes in this research are guided by the EFQM Excellence Model criteria. Quality Award models are viewed as comprehensive by many researchers and practitioners and have been used in previous research to derive empirical constructs (Samson and Terziovski, 1999; Woon, 2000; Rahman, 2001). The development of the items was also reinforced by an extensive review of the literature and detailed evaluations by academics and practitioners alike. It is therefore argued that the TQM constructs can be considered to have content validity.

Convergent validity

Convergent validity refers to the degree to which a measure converges on a same model with the remaining measures forming part of the same concept. Thus, a strong condition of convergent validity is that all scale items load significantly on their hypothesised latent variable and have a loading of 0.6 or better (Anderson and Gerbing, 1988). A single-factor confirmatory factor analysis was carried out when feasible, given that CFA needs at least four items per latent variable to obtain degrees of freedom. When this condition was not achieved, the corresponding construct was allowed to correlate to another construct to obtain the factor loadings. Consequently, a single factor model was performed for Leadership, People, and Policy and Strategy, whereas the Processes and Resources construct correlated to that of Partnership, represented by two items. As three categories of outcomes within Key Performance Results -financial, suppliers and costs- are also estimated by less than four items, we ran a

model so that all the Key Performance Constructs could correlate. For the same reason, Results on Society correlate with the results for People and Clients. Table 1 shows the results of these analyses, which prove the convergent validity of each scale. The great majority of the items used proved to achieve convergent validity in their respective scales, although four items were deleted after this analysis (see items in bold type in Appendix 1).

Table 1: Construct validity and reliability

FACTOR Item	Loadings	T-Value	Composite Reliability	AVE	Cronbach's Alpha	Goodness of Fit
LEADERSHIP (LEAD) Leader2 Leader3 Leader4 Leader8 Leader10 Leader11 Leader12	0.86 0.87 0.88 0.77 0.84 0.87 0.83	7.816 9.304 10.931 7.713 10.156 12.065 10.458	0.946	0.716	0.945	*S-B c^2* *(14)=27.8937* P=0.01470 BBNNFI=0.922 CFI=0.959 IFI=0.960 GFI=0.888 SRMR=0.034
PEOPLE (PEOP) People1 People2 People3 People4 People5 People6 People7 People8 People9 People10	0.82 0.78 0.80 0.76 0.87 0.83 0.72 0.65 0.75 0.77	13.702 9.788 8.675 9.831 10.966 12.829 8.381 7.104 7.877 11.058	0.951	0.611	0.934	*S-B c^2* *(35)=42.7784* P=0.17182 BBNNFI=0.928 CFI=0.986 IFI=0.986 GFI=0.837 SRMR=0.052
POLICY AND STRATEGY (P&S) Polest1 Polest2 Polest3 Polest4 Polest5 Polest6 Polest7	0.85 0.88 0.73 0.83 0.87 0.74 0.88	10.432 9.650 8.008 9.972 12.289 9.638 11.163	0.938	0.685	0.936	*S-B c^2* *(14)=22.0982* P=0.07662 BBNNFI=0.943 CFI=0.978 IFI=0.978 GFI=0.923 SRMR=0.030
PROCESSES AND RESOURCES (P&R) Process1 Process2 Process5 Process6 Process7 Process8 Process9 Process10 Process11 Part&res5 Part&res6 Part&res7 Part&res8	0.70 0.86 0.74 0.75 0.82 0.71 0.77 0.91 0.83 0.72 0.75 0.78 0.75	7.275 9.132 8.407 8.500 8.144 7.398 8.137 9.191 10.239 7.855 5.955 7.788 7.069	0.971	0.615	0.951	*S-B c^2* *(89)=133.7315* P=0.00153 BBNNFI=0.909 CFI=0.923 IFI=0.925 GFI=0.813 SRMR=0.050
PARTNERSHIPS (PART) Part&res1 Part&res2	0.95 0.68	8.754 7.955	0.807	0.682	0.773	

KEY PERFORMANCE RESULTS (KPERF)						
Financial (FINR)						
Financialr1	0.92	10.672	0.939	0.837	0.939	
Financialr2	0.97	13.851				
Financialr3	0.85	10.100				
Suppliers (SUPPLR)						
Supplr1	0.86	8.332	0.909	0.770	0.905	
Supplr2	0.92	11.325				
Supplr3	0.85	8.910				
Processes (PROCR)						
Procr1	0.78	8.581	0.932	0.696	0.930	$S\text{-}B\ c^2$ $(84)=116.4094$
Procr2	0.83	8.547				P=0.01112
Procr3	0.89	10.512				BBNNFI=0.952
Procr4	0.84	8.061				CFI=0.961
Procr5	0.82	8.073				IFI=0.962
Procr6	0.84	10.409				GFI=0.743
Costs (COSTR)						SRMR=0.061
Costr1	0.81	8.499	0.839	0.636	0.802	
Costr3	0.75	8.557				
Costr4	0.83	10.257				
CUSTOMER RESULTS (CUSTR)						
Custr1	0.89	9.160	0.917	0.689	0.914	
Custr2	0.90	7.150				
Custr3	0.79	8.470				
Custr4	0.76	6.930				
Custr5	0.80	5.628				$S\text{-}B\ c^2$ $(51)=84.9838$
SOCIETY RESULTS (SOCR)						P=0.00198
Socr1	0.91	8.485	0.928	0.865	0.925	BBNNFI=0.889
Socr2	0.95	9.287				CFI=0.914
PEOPLE RESULTS (PEOPR)						IFI=0.917
Peopr2	0.78	9.270	0.915	0.687	0.905	GFI=0.858
Peopr4	0.63	7.363				SRMR=0.053
Peopr5	0.89	10.369				
Peopr6	0.92	9.707				
Peopr7	0.89	8.421				

Reliability - stage two

By using the actual loadings from the confirmatory results, an additional internal consistency measure can be obtained as a test of reliability: composite reliability (Fornell and Larcker, 1981). Composite reliability is a measure of the average variance shared between a construct and its measures; it does not assume, like Cronbach's alpha, that all the loadings are equal to 1; nor is it influenced by the number of attributes associated with each construct. Another measure suggested by Fornell and Larcker (1981) to examine the shared variance among a set of observed variables measuring an underlying construct is the average variance extracted (AVE), which is also calculated when evaluating the reliability of the scales, although, as Fornell and Larcker (1981) note, AVE is an even more conservative measure than composite reliability. In general, composite reliabilities of at least 0.7 and average variances extracted of at least 0.5 are considered desirable (Hair *et al.* , 1999). Therefore, construct reliability was again evaluated using estimated model parameters (e.g., composite reliability, average variance extracted).

As Table 1 shows, each construct manifests a composite reliability greater than the recommended threshold value of 0.7. The AVEs range between 0,611 and 0,837, above the recommended 0.50 level.

Discriminant validity.

Discriminant validity is ensured when the measurement items posited to reflect a construct differ from those that are not believed to make up the construct. This is particularly important when constructs are highly correlated and similar in nature. An alternative test of discriminant validity is to

determine whether the correlation between constructs is significantly less than one. In practice, this requires that the 95 percent confidence interval for each pair-wise correlation (i.e., plus or minus two standard errors) does not contain the value 1 (Anderson and Gerbing, 1988). This would prove that the correlation between the dimensions is significantly far from 1, and therefore that the dimensions represent different concepts.

Because we could not include all the criteria in a single model without violating the ratio of sample size to number of parameters (Jöreskog and Sörbom, 1995), we divided the set of scales into various sub-models grouping related constructs to obtain correlations. This approach is well established in the literature (Bentler and Chou 1987; Doney and Cannon 1997; Atuahene-Gima and Li, 2002).

The first set of correlations was obtained from the model run with the four categories of Key Performance Results (see Table 1). Once the discriminant validity of these dimensions had been established, as shown in Table 2, we tested their convergence on a single factor to ensure the unidimensionality of the Key Performance Results (see Table 3). Thus, as the single-factor model has an acceptable fit, the construct is deemed unidimensional (Payan and McFarland, 2005). Accordingly, another CFA was run to obtain the correlations amongst the measures of Results on Clients, Society, People and Key Performance Results (see Table 4).

TABLE 2. Discriminant validity of Key Performance Results

Construct	Covariance	Confidence Intervals of covariance coefficients
FINR-SUPPLR	0.614	(0.488-0.740)
FINR-PROCR	0.671	(0.515-0.827)
FINR-COSTR	0.702	(0.546-0.858)
SUPPLR-PROCR	0.758	(0.650-0.866)
SUPPLR-COSTR	0.727	(0.569-0.885)
PROCR-COSTR	0.750	(0.758-0.842)

Table 3: Unidimensionality of the Key Performance Results

Item	Loadings	T-Value	Composite Reliability	AVE	Cronbach's Alpha	Goodness of Fit
FINR	0.73	7.795	0.883	0.656	0.877	*S-B c^2 (2)=0.0799*
SUPPLR	0.78	8.191				P=0.96083
PROCR	0.90	10.793				BBNNFI=1.042
COSTR	0.82	8.632				CFI=1.000
						IFI=1.014
						GFI=0.999
						SRMR=0.004

Table 4: Discriminant validity of the Results criteria

Construct	Covariance	Confidence Intervals of covariance coefficients		
CUSTR-SOCR	0.575	(0.367-0.783)		
CUSTR-PEOPR	0.826	(0.730-0.922)		
CUSTR-KPERF	0.864	(0.772-0.956)		
SOCR-PEOPR	0.509	(0.257-0.761)		
SOCR-KPERF	0.581	(0.383-0.779)		
PEOPR-KPERF	0.745	(0.613-0.877)		
Goodness-of-fit statistics	*S-B c^2 (98)=153.8193* P=0.00027	BBNNFI=0.886 CFI=0.907 IFI=0.911	GFI=0.811	SRMR=0.057

A second CFA model included the correlations of each of the TQM Enablers with the Clients, People, Society and Key Performance results. In order to increase sample size relative to the parameter estimates, we used single-scale score indicators to measure the Enablers' latent constructs. Thus, the actual level of the constructs was represented by the median of the measurement items that survived the scales validation process. The measurement error terms for each of these constructs were fixed at (1-composite reliability coefficient) times the variance of each scale score in the final model to determine the extent to which measurement error affected the observed pattern of relationships (MacKenzie *et al*., 1998).

Table 5: Discriminant validity of research model constructs

Construct	Covariance	Confidence Intervals of covariance coefficients
LEAD-PEOP	0.711	(0.737-0.845)
LEAD-P&S	0.775	(0.649-0.901)
LEAD-P&R	0.715	(0.597-0.833)
LEAD-PART	0.469	(0.297-0.641)
LEAD-CUSTR	0.570	(0.360-0.780)
LEAD-SOCR	0.465	(0.217-0.713)
LEAD-PEOPR	0.610	(0.398-0.822)
LEAD-KPERF	0.582	(0.364-0.800)
PEOP-P&S	0.701	(0.559-0.843)
PEOP-P&R	0.573	(0.415-0.731)
PEOP-PART	0.398	(0.116-0.680)
PEOP-CUSTR	0.468	(0.270-0.666)
PEOP-SOCR	0.429	(0.227-0.631)
PEOP-PEOPR	0.548	(0.358-0.738)
PEOP-KPERF	0.543	(0.351-0.735)
P&S-P&R	0.748	(0.626-0.870)
P&S-PART	0.467	(0.153-0.781)
P&S-CUSTR	0.608	(0.434-0.782)
P&S-SOCR	0.411	(0.139-0.683)
P&S-PEOPR	0.502	(0.248-0.756)
P&S-KPERF	0.530	(0.310-0.750)
P&R-PART	0.580	(0.356-0.804)
P&R-CUSTR	0.750	(0.772-0.828)
P&R-SOCR	0.508	(0.288-0.728)
P&R-PEOPR	0.657	(0.511-0.803)
P&R-KPERF	0.711	(0.585-0.837)
PART-CUSTR	0.422	(0.170-0.674)
PART-SOCR	0.240	(-0.074-0.554)
PART-PEOPR	0.392	(0.152-0.632)
PART-KPERF	0.340	(0.052-0.628)
CUSTR-SOCR	0.557	(0.371-0.743)

CUSTR-PEOPR	0.713	(0.725-0.801)		
CUSTR-KPERF	0.759	(0.769-0.849)		
SOCR-PEOPR	0.474	(0.224-0.724)		
SOCR-KPERF	0.554	(0.360-0.748)		
PEOPR-KPERF	0.727	(0.601-0.853)		
Goodness-of-fit statistics	**S-B c^2 (163)=253.7822** P=0.00001	BBNNFI=0.971 CFI=0.978 IFI=0.979	GFI=0.769	SRMR=0.116

The results obtained (see Table 5) show that there is discriminant validity between all the dimensions considered. The highest correlation between dimensions was 0,859 (between the Clients Results and the Key Performance Results scales). The associated confidence interval was 0.77 to 0.95. Hence discriminant validity was supported for all pairs of dimensions. Again, once the discriminant validity of the Enablers' constructs had been proven, their convergence on a single factor was tested to confirm the existence of a single dimension underlying these practices, the actual firms' level of adoption of TQM. The convergence of all the dimensions of business performance considered in the EFQM Model was similarly evaluated. The empirical evidence obtained in both cases is shown in Table 6, this evidence allows considering a single factor to represent the TQM practices and the TQM results in the research model, thus both TQM practices and the TQM results are deemed unidimensional constructs.

Table 6: Unidimensionality of the TQM's Enablers and Results

FACTOR Item	Loadings	T-Value	Composite Reliability	AVE	Cronbach's Alpha
TQM'S ENABLERS Leadership People Policy and Strategy Processes and Resources Partnerships	0.92 0.86 0.87 0.84 0.60	11.295 11.220 10.160 7.554 5.461	**0.912**	**0.678**	**0.900**
Goodness-of-fit statistics	**S-B c^2 (5)=11.3805** P=0.04434		BBNNFI=0.922 CFI=0.961 IFI=0.962	GFI=0.926	SRMR=0.041
RESULTS Customer Results Society Results People Results Key Performance Results	0.91 0.59 0.81 0.81	7.370 5.012 7.690 9.767	**0.866**	**0.622**	**0.841**
Goodness-of-fit statistics	**S-B c^2 (2)=0.9739** P=0.61451		BBNNFI=1.037 CFI=1.000 IFI=1.012	GFI=0.993	SRMR=0.017

Criterion-related validity

Criterion-related validity is concerned with the extent to which an instrument is related to an independent measure of the relevant criterion. Thus, a set of quality-management constructs has criterion-relation validity if the collective measure of the constructs is highly and positively correlated with a measure of performance. Although predictive validity can be assessed in this way, it can also be tested in the measurement model if the latter contains the construct of interest and a construct that it should predict (Garver and Mentzer, 1999).

Therefore, criterion-related validity of the five TQM Enablers was initially evaluated by examining the multiple correlation coefficients computed for the five measures and the results of the EFQM programme. The multiple correlation coefficients obtained were in all cases above 0.5 (p < 0.001), providing strong evidence of criterion-related validity. The analysis of the proposed SEM model will provide further evidence on this topic.

6 RESEARCH MODEL TESTING

Our model suggests that there is a latent factor, designed as TQM that represents the quality practices developed by the firms following the EFQM framework. This latent factor achieves higher values if all the Enablers are performed, that is, if a global orientation is adopted in the application of the EFQM Model. Thus, total quality is evaluated by the various Enablers of the EFQM framework and conceived as a primary influence on organizations' performance. Business performance is also represented by a latent construct which embodies the overall performance according to all the Model's results indicators. The SEM results of the relationship between TQM practices and performance show a strong correlation between these variables (ß=0.81; p=0.001) and the structural model explains the 65.0 percent of the variation in business results. The goodness-of-fit statistics used to assess the fit of the data to the hypothesized model are the same as those used to test the measurement models: (*S-B c^2 (26)=43.6689;* P=0.01640; BBNNFI=0.921; CFI=0.943; IFI=0.945; GFI=0.860; SRMR=0.050). These indices also reveal a good fit of the model to the data. Consequently, the hypothesis formulated (H1) is confirmed. This brings about an important practical implication of the study: the balanced adoption of the TQM practices represented by the Enabler constructs leads to substantially better organizational performance in relation to a firm's main competitors.

7 CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

As implementing and developing TQM requires major organisational commitment and effort, there is a need for clear evidence that TQM really has a positive impact on performance. Similarly, results should be susceptible to comparison and useful for firms attempting to achieve total quality. This research uses the EFQM Excellence Model as a guide to measure total quality practices. Its main objectives are to provide empirical evidence on the outcomes that may be expected by firms willing to adopt TQM according to this Model, and to develop and describe a specific measurement instrument to this end. To adequately develop an instrument for measuring the TQM implementation it is devoted a great effort to justify the appropriateness of the scales. This has been made using stringent criteria and combining exploratory and confirmatory analysis. Additionally, the scales are facilitated to allow either undertaking a straightforward replication of the study, or the future development by researchers of comparisons among studies with similar purposes. The excellent works of Eskildsen and Dahlgaard (2000) and Bou-Llusar *et al.* (2005), although resort to SEM to analyze the proposed relationships, do not focus on the former aspects -detailed scales and validity and reliability analysis.

The paper also contributes to TQM literature by proving the positive causal relationship between the EFQM's Enablers and firms' Results. Additionally, the use of a Quality Award as a point of reference to measure TQM practices, and the inclusion of all the EFQM Model's expected outcomes, is a valuable benchmarking data for firms, particularly in the European context. Thus, as the similarities of European regional markets increase, and environmental conditions become smoother, the direct, general applicability of the TQM concept represented by the EFQM Model will grow, obviating any concerns about universalism. Moreover, the EFQM Excellence Model constitutes an unquestionable benchmark in TQM for European firms, and is receiving an ever-growing number of applications for recognition at its different levels (Committed to Excellence, Recognised for Excellence, and the EFQM Excellence Award). We can therefore conclude that: a) adopting the EFQM Excellence Model contributes to firms outperforming competition, i.e., the achievement of competitive advantage; b) there is no concern regarding its universal usability within the European context; and c) it represents the next step to be taken by all European firms committed to quality management in order to surpass the Quality Assurance stage.

The results reported, however, must be treated with caution. The research constitutes a cross-sectional snapshot based on 93 firms operating in the north of Spain. We can neither trace the progress of the companies in our study nor estimate the potential lags between TQM adoption and the outcomes achieved by the firms. A longitudinal study would be necessary to overcome such limitations. Moreover, sample size is far below the number of cases reported in other research, which has led in this case to a more complex data analysis. It would be advisable to replicate the study in broader contexts to confirm the underlying factors identified in this case. The study also suffers from a common limitation in quantitative research: the use of subjective measures for the variables considered. However, it is widely reported in the literature that this procedure increases the response rate as well as that there is a high correlation between subjective and objective data on performance (Venkatraman and Ramanujan, 1986). The use of self-reported data may induce social desirability bias, although the assurance of anonymity can reduce such bias when responses concern sensitive topics (Hair et al., 1999). Finally, although some items have been deleted in the validation process, it must be borne in mind that the different items employed to approximate the underlying constructs "overlap" to some extent to try to

capture the underlying constructs measure. Thus, items are expected to be correlated (measures should possess internal consistency reliability) so that dropping some items of the measurement model does not necessarily alter the meaning of the construct (Jarvis *et al.*, 2003). In this respect, four items pertaining to the organization's external orientation (customers, stakeholders and community) are deleted in the Leadership factor. This can be considered a problem since customer satisfaction is basic to TQM. However, several items concerning the anticipation and management of organizational change survive, which involve a careful monitoring of the environment, and a clear intention to meet the market needs.

This research acknowledges the multidimensional nature of TQM. However, future research should consider the interactions not only between specific TQM practices themselves but also between these practices and the different sets of performance variables if we are to obtain a better understanding of quality management. The correlations between the EFQM Excellence Model's constructs indicate that the different activities and outcomes are not independent. Eskildsen and Dahlgaard (2000) illustrate the relationships between the Enabler criteria and People Results within a European service firm. Calvo-Mora *et al.* (2005) replicate this research using a sample of 111 Spanish university centres, assuming the same interactions as the aforementioned study between the Enablers, and including the interactions between the four types of results of the Model (People, Students, Centre and Society). However, in the latter study, Process Management is the only Enabler shown to have a direct impact on performance variables, whereas Eskildsen and Dahlgaard (2000) confirm that it is the People Enabler which directly affects the People Results. In this line, and based on business organizations, the study of Bou-Llusar *et al.* (2005) uses canonical correlations to explore the associations between the EFQM criteria, although indirectly infers the causal relationship between Enablers and Results. In short, this is still a recent line of investigation and more empirical support from different settings is required. This evidence will also enable better understanding of which TQM practices may have a more positive effect on different types of performance. Finally, we believe that the role of firms' competitive environments as an antecedent of the adoption TQM practices, or as a moderator of the TQM-performance relationship, also deserves future research. It is necessary to develop a deeper understanding of the type of environments that favour the TQM adoption, or that could made the TQM a more valuable resource to obtain, if the TQM-performance relationships is positively moderated.

Appendix 1: Research Scales

TOTAL QUALITY MANAGEMENT

LEADERSHIP	
Long-term customer satisfaction is laid down as the organization's mission and basic principle	*Leader1*
Organizational leaders take on the responsibility for developing quality oriented management systems	Leader2
Leaders personally assess the application and progress of total quality principles	Leader3
Leaders allocate resources for continuous improvement of the management system	Leader4
Leaders interact with customers and keep in mind their contributions when designing goods and services	*Leader5*
Leaders always bear in mind stakeholder groups	*Leader6*
Leaders activities seek to provide value for the community and protect the environment.	*Leader7*
Leaders listen and support employees and encourage them to take part in deciding and managing total quality policies and plans.	Leader8
Leaders acknowledge and reward employees' contributions to bettering quality.	Leader9
Leaders pre-empt change needed in the organization and pinpoint the factors that lead to a need for change.	Leader10
Leaders provide a plan detailing the different stages of change, and secure the investment, resources and support needed to achieve change.	Leader11
Leaders measure and review the effectiveness of organizational change and share the knowledge that is obtained.	Leader12
PEOPLE	
In human resource planning, the employee is considered an 'internal customer' who participates in policy, strategies and organizational structure.	People1
Employees know that quality is their responsibility, and they are encouraged to meet customers' and the organization's objectives.	People2
Continuous improvement is consistently fostered and facilitated	People3
Employees are given tailor-made preparation for their jobs and are qualified to solve quality problems.	People4
Staff is continuously trained in the principles of quality, team work and job-specific skills.	People5
Employees are actively involved in quality-related activities and the success of the company, and many of their suggestions are implemented	People6
Employees are responsible for quality and end results of the product/service. They can take decisions independently.	People7
There are quality circles and/or interdepartmental teams to improve quality.	People8
The company has effective two-way communication links with its employees.	People9

The pay and promotion systems acknowledge efforts to improve quality.	People10
Pay and acknowledgement systems are based on quality-related objectives and on company results.	**People11**
Employees receive the right occupational health and safety training at work.	*People12*

POLICY AND STRATEGY	
The company draws up strategic action plans (used to regularly review and to establish the organization's short-term and long-term objectives and to pre-empt competitive situations). Their 'gold standard' is a commitment to quality.	Polest1
Strategic plans and related policies always consider customers' needs, suppliers' capacities and the needs of any other stakeholders in the company's activities.	Polest2
Detailed information about such things as competitors' actions, other market agents' behavior, legal and environmental issues, etc is collected to help formulate strategy.	Polest3
Information from all the company's processes is analyzed when strategy is defined.	Polest4
Progress towards achieving strategic objectives is regularly assessed.	Polest5
SWOT analysis is regularly used to review and update business strategy.	Polest6
Resources are allocated to achieve strategic objectives.	Polest7

PROCESSES	
Processes are designed ensuring that skills and capacities are right for company needs.	Process1
All processes, procedures and products are assessed regularly in an attempt to bring in change and improvement.	Process2
New products and/or services are designed thoroughly and meticulously before being manufactured and marketed so as to ensure that clients' present and future expectations are met.	**Process3**
Quality-related criteria predominate over speed and cost when developing new products.	*Process4*
The different company departments liaise during the development of new products/services.	Process5
We regularly ask our clients what they want from our products now and in the future.	Process6
Our clients' needs are passed on and are understood at all levels.	Process7
Clients leave is thoroughly analyzed.	Process8
We use clients' complaints and grievances to improve our products.	Process9
Present relationships with clients are analyzed and regular attempts are made to improve them.	Process10
We strive to increase our level of commitment towards our client via policies designed to encourage customer loyalty, guarantees, etc.	Process11

PARTNERSHIPS AND RESOURCES	
We have close, long-term relationships with our supplies designed to resolve quality-related problems.	Part&res1
Our suppliers help to improve our products and/or services and also provide technical assistance.	Part&res2
The company is prepared to form alliances with partners and collaborator in the market in an attempt to achieve competitive advantage.	*Part&res3*
Work is organized around reducing and optimizing physical, economic and financial resources.	*Part&res4*
Our company makes ongoing efforts to keep their facilities clean and in order.	Part&res5
The company coordinates its strategies and it technological equipment, machinery and know-how.	Part&res6
Our company strives to improve operational efficiency by efficient use of technology.	Part&res7
Our company creates databases and files with the information it has in order to analyze and learn.	Part&res8
There is updated quality-related data available to all members of the company.	*Part&res9*

CLIENTS' RESULTS	
Improved satisfaction of our clients.	Custr1
Improved communication with our clients.	Custr2
A reduction in the number of customer complaints and grievances.	Custr3
Client consolidation, returning clients and loyal clients	Custr4
Improved client perception of the company.	Custr5

PEOPLE RESULTS	
Enhanced communication between employees	**Peoprs1**
Improved satisfaction of the employees	Peoprs2
Improved Absenteeism	*Peoprs3*
Less staff turnover	Peoprs4
Improved ability of staff to react to changing customer requirements.	Peoprs5
Improved ability of staff to inform and advise clients about products and services.	Peoprs6
Improved skills of employees.	Peoprs7

SOCIETY RESULTS	
Improved social image.	Socr1
Improved view of the company as a responsible member of the community that, when possible, creates employment, implements equal rights policies, concerns itself with accident and environmental damage protection, and encourages and sponsors activities that are beneficial to society as a whole.	Socr2

KEY PERFORMANCE RESULTS	
Increased sales	Financialr1
Increased market share	Financialr2
Increased profit	Financialr3
Improved quality of suppliers' goods.	Supplr1
Better relationships with suppliers.	Supplr2
Improved delivery deadlines from suppliers.	Supplr3
Improved process efficiency (faulty parts per total production).	Procr1
Enhanced knowledge of the best way to handle processes.	Procr2
Improved manufacturing time and customer delivery times.	Procr3
More process flexibility.	Procr4

More process productivity.	Procr5
Improved delivery times of customer orders.	Procr6
Lower percentage of faulty products and/or sub-standard service provision.	Costr1
Quality of products/ services compared to competitors.	**Costr2**
Less waste products	Costr3
Lower costs of quality management	Costr4

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