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# The impact of "soft" and "hard" TQM elements on quality management results

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## Abstract

**Purpose** – The purpose of this paper is to explore the relationships between "soft" and "hard" TQM elements and quality management results.

**Design/methodology/approach** – Empirical data were drawn from 370 Greek companies using the questionnaire method. Confirmatory Factor Analysis was used to examine constructs' reliability and validity, while the relationships between them were examined through Structural Equation Modelling.

**Findings** – The study proved that quality improvement and the consolidation of the company's market position are influenced mainly by adopting "soft" TQM elements and secondarily "hard" TQM elements.

**Research limitations/implications** – The fact that the study was based on quality managers' perceptions and the participation of companies from all sectors creates limitations, but also future research orientations.

**Practical implications** – To achieve benefits and obtain a competitive advantage, which is of major importance for the sustainability of a company, quality design, control and improvement tools are not enough and the adoption of a TQM culture is primarily required.

**Originality/value** – The study describes in a reliable and valid way a model which consists of "soft" and "hard" TQM elements and quality management results.

**Keywords** Total quality management, Quality management, Greece

**Paper type** Research paper

## Introduction

Systems for improving and managing quality have rapidly evolved in recent years. During the last decades simple inspection activities have been replaced or supplemented by quality control and quality assurance standards. The fourth level of quality management is that of Total Quality Management (van der Wiele *et al.*, 1997). When Deming introduced TQM in the 1950s, the Japanese adopted this philosophy while the USA rejected its principles. Thus, the Japanese made a significant progress in the field of quality (Talha, 2004), resulting in the penetration of USA markets by Japanese products (Martinez-Lorente *et al.*, 1998). Therefore, in the early 1980s, the USA utilized TQM concepts as tools to compete with Japan (Davig *et al.*, 2003; Sun *et al.*, 2004). European organizations also recognized the need for a keener focus on quality and in the 1990s, TQM concepts spread to Europe (Sun *et al.*, 2004).

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However, making the step towards TQM was much more difficult as there was widespread confusion about the components of TQM and how they could be implemented. This was because TQM was a rather abstract philosophy and did not have clear guidelines on its implementation (Sun *et al.*, 2004). Coleman and Douglas (2003) stated that TQM is too abstract with many definitions and a lack of "hard" requirements. According to Zairi (1994), there is nothing wrong with TQM terminology and as a philosophy it is fine, provided that we understand its workings and its benefits, which are long-term. The problem became easier to solve as TQM components were more clearly understood through the development and the worldwide acceptance of quality awards models (Sun *et al.*, 2004). Excellence models are helpful in defining TQM in a way in which management can more easily understand. They also help organizations to develop and manage their continuous improvement activities in a number of ways (van der Wiele *et al.*, 2000).

In almost all TQM definitions a reference is made to its "soft" and "hard" side (Vouzas and Psyhogios, 2007). The "soft" side is associated with management concepts and principles such as leadership, employee empowerment and culture, while the "hard" side refers to quality improvement tools and techniques (Vouzas and Psyhogios, 2007; Thiagaragan *et al.*, 2001). The "soft" TQM elements are long-term issues and therefore must be emphasized and addressed accordingly in an organization's TQM implementation plan. The effective manipulation of the "soft" elements must be supported by the "hard" elements of TQM (Zairi and Thiagarajan, 1997).

Despite the numerous studies in TQM literature, authors such as Idris and Zairi (2006), Singh and Smith (2006), Gotzamani *et al.* (2006), Karuppusami and Gandhinathan (2006), Sila and Ebrahimpour (2005), Prajogo (2005), Vouzas and Gotzamani (2005), Sun *et al.* (2004), Rahman (2004), Coleman and Douglas (2003) and Dale (2002), recommend that further efforts should be made aiming at the diachronic evaluation of TQM elements, the results of their adoption and mainly the type and extent of their relationships. As Dale (2002) noted, improvement is a process, which, once started, should never end and the same can be said of the research into TQM.

The purpose of this paper is to examine the impact of "soft" and "hard" TQM elements on quality management results. The model reliability and validity was examined through Confirmatory Factor Analysis, while the relationships between "soft" and "hard" TQM elements and quality management results were examined through Structural Equation Modelling.

The rest of the paper is organized as follows: the first part reviews the existing TQM literature. The second part describes the methodology of a research carried out in Greek companies. The third part presents the analysis and the respective results. Finally, the results of research are discussed and final conclusions are presented.

## Theoretical background

Deming's 14 points and cycle (plan, do, check, act), Juran's quality trilogy (planning, control and improvement), Crosby's absolutes of quality management (conformance to requirements, prevention, zero defects and cost of quality), Garvin's quality dimensions, Ishikawa's cause and effect diagram, Feigenbaum's three steps to quality (quality leadership, modern quality technology and organizational commitment) and Taguchi's advice to companies to turn to Statistical Process Control and Design of Experiments, that is "On-line" and "Off-line" quality control

respectively, constitute the most important aspects of the TQM framework that quality gurus have recommended.

There is no unique model for a good TQM programme and TQM is a network of interdependent elements, namely critical factors, practices, techniques and tools (Tari, 2005). However, TQM without certain elements is likely to yield little in the way of real benefits (Curry and Kadasah, 2002). Despite the divergence of views on what constitutes TQM there are a number of common elements running through the various definitions (Martinez-Lorente *et al.*, 1998). "Soft" TQM elements as they have been detected in recent studies are the following (Table I): leadership, strategic quality planning, employee management and involvement, supplier management, customer focus, process management, continuous improvement, information and analysis, knowledge and education. A number of quality management tools and techniques were

| | Articles |
|---|---|
| *"Soft" TQM* | |
| Leadership | Yang (2006), Hoang *et al.* (2006), Singh and Smith (2006), Gotzamani *et al.* (2006), Hafeez *et al.* (2006), Armstrong-Stassen *et al.* (2005), Prajogo and McDermott (2005), Sila and Ebrahimpour (2005), Prajogo (2005), Miyagawa and Yoshida (2005), Lagrosen and Lagrosen (2005), Tari (2005) |
| Strategic quality planning | Drew and Healy (2006), Yang (2006), Hoang *et al.* (2006), Gotzamani *et al.* (2006), Prajogo and McDermott (2005), Sila and Ebrahimpour (2005), Prajogo (2005), Miyagawa and Yoshida (2005), Tari (2005), Bou-Llusar *et al.* (2005) |
| Employee management and involvement | Drew and Healy (2006), Yang (2006), Hoang *et al.* (2006), Singh and Smith (2006), Gotzamani *et al.* (2006), Hafeez *et al.* (2006), Armstrong-Stassen *et al.* (2005), Prajogo and McDermott (2005), Sila and Ebrahimpour (2005), Prajogo (2005) |
| Supplier management | Drew and Healy (2006), Yang (2006), Singh and Smith (2006), Gotzamani *et al.* (2006), Sila and Ebrahimpour (2005), Miyagawa and Yoshida (2005), Tari (2005) |
| Customer focus | Yang (2006), Hoang *et al.* (2006), Singh and Smith (2006), Gotzamani *et al.* (2006), Drew and Healy (2006), Prajogo and McDermott (2005), Sila and Ebrahimpour (2005), Prajogo (2005), Tari (2005) |
| Process management | Yang (2006), Hoang *et al.* (2006), Singh and Smith (2006), Gotzamani *et al.* (2006), Prajogo and McDermott (2005), Sila and Ebrahimpour (2005), Prajogo (2005), Lagrosen and Lagrosen (2005), Tari (2005) |
| Continuous improvement | Yang (2006), Hafeez *et al.* (2006), Armstrong-Stassen *et al.* (2005), Lagrosen and Lagrosen (2005), Tari (2005) |
| Information and analysis | Hoang *et al.* (2006), Singh and Smith (2006), Gotzamani *et al.* (2006), Armstrong-Stassen *et al.* (2005), Prajogo and McDermott (2005), Sila and Ebrahimpour (2005), Prajogo (2005), Lagrosen and Lagrosen (2005), Miyagawa and Yoshida (2005) |
| Knowledge and education | Drew and Healy (2006), Yang (2006), Hoang *et al.* (2006), Hafeez *et al.* (2006), Armstrong-Stassen *et al.* (2005), Miyagawa and Yoshida (2005), Tari (2005) |
| *"Hard" TQM* | |
| Quality tools and techniques | Drew and Healy (2006), Tari (2005), Lagrosen and Lagrosen (2005), Bayazit (2003), Ahmed and Hassan (2003) |

**Table I.**
"Soft" and "hard" TQM elements used in recent studies

introduced as a means of increasing awareness of TQM concepts and the importance of continuous and company-wide improvement (Bunney and Dale, 1997). "Hard" TQM elements include quality management tools and techniques such as flow charts, relations diagram, scatter diagram, control charts, Pareto analysis, quality function deployment, design of experiments and so on.

A significant number of companies have adopted some form of TQM in their business and have derived demonstrable benefits (Rahman and Sohal, 2002). Furthermore, there is a trend towards stronger demand for improved measures of the performance of companies and TQM has a role to play in relation to this (Williams *et al.*, 2004). Exploring the TQM literature the following quality management results are referred (Table II): customer satisfaction, employee satisfaction, impact on society and internal and external business results.

Lagrosen and Lagrosen (2005) studied the effects generated by "soft" TQM elements, quality management models and tools. They showed that there is a correlation between how well quality management works and to what extent the company adopts "soft" TQM elements. However, the most important "soft" TQM elements were continuous improvement, management by facts and participation of everybody. Furthermore, they found that the use of quality management models is related to well functioning quality management and models such as ISO 9000, Swedish Quality Award and European Quality Award were found to be the most important. Finally they showed that there is a correlation between the use of quality management tools and well functioning quality management.

Tari (2005) indicated that the weaknesses in ISO 9000 certified firms were human aspects such as work teams, suggestions schemes, recognition models and the use of quality techniques and tools. He concluded that companies wishing to go beyond ISO 9000 must improve all these aspects in order to improve their competitiveness through improved business results.

Ahmed *et al.* (2005) concluded that the success of any quality management system depends greatly on the strong commitment of top management and how customers are valued. They also mentioned that in order to determine the effectiveness of quality management systems, quantifying quality improvement is essential. Different tools are available for measuring quality improvement such as benchmarking, statistical process control and defect cost analysis. Finally, they mentioned that such measurements constitute only the first step towards the never-ending cycles of continual process improvement and that the objective is to use the results obtained

| TQM results | Articles |
|---|---|
| *Customer satisfaction* | Yang (2006), Singh and Smith (2006), Hafeez *et al.* (2006), Miyagawa and Yoshida (2005), Tari (2005), Bou-Llusar *et al.* (2005), Sila and Ebrahimpour (2005) |
| *Employee satisfaction* | Yang (2006), Tari (2005), Bou-Llusar *et al.* (2005), Sila and Ebrahimpour (2005) |
| *Impact on society* | Singh and Smith (2006), Miyagawa and Yoshida (2005), Tari (2005), Bou-Llusar *et al.* (2005) |
| *Business results* | Drew and Healy (2006), Singh and Smith (2006), Hafeez *et al.* (2006), Sila and Ebrahimpour (2005), Miyagawa and Yoshida (2005), Tari (2005), Bou-Llusar *et al.* (2005) |

**Table II.**
TQM results according to recent studies

from such measurements to decision making, in order to achieve continual improvement and therefore satisfy the customers' ever ending needs and requirements.

Ally and Schloss (2003) shed light on quality management issues regarding the maquiladora industry in Mexico. Their study provided evidence of a decent quality system in the maquiladoras based on TQM and SPC principles, utilizing the teamwork approach to problem solving, providing training to employees, working with suppliers and striving for quality certifications. In other words, by establishing quality systems, implementing quality principles and techniques and training managers and employees in quality issues, the maquiladoras are playing a significant role in creating a quality culture in Mexico's industry. As these authors noted, this quality culture could be instrumental in transforming industry into a global power recognized for its world-class manufacturing and excellence in quality.

Bayazit (2003) found that the TQM implementation status for the large companies in Turkey was fairly mature. Top management support, employee involvement and commitment, customer focus, quality education and training, teamwork and quality tools and techniques were the main factors that contributed to the success of TQM efforts. The most important achievements after implementing TQM were an increase in customer satisfaction, quality improvement, a decrease in prices, on time delivery, an increase in profitability and market share, an increase in work satisfaction, workforce quality, work harmony and a decrease in defects.

Ahmed and Hassan (2003), argue that quality management cannot be ensured without the application of appropriate tools either management or statistical. Firms with greater implementation of these quality tools can improve their business results. These tools are required in any firm irrespective of its size. Finally, they suggest that firms should accept the quality practices as part of their life, in order for them to be benefited.

As Idris and Zairi (2006) noted, until this millennium TQM had survived the test of time as a corporate philosophy. However, will it sustain as a dominant logic of business corporate strategy in the future? As they noted, this question, among academics and practitioners, remains not fully answered by the past literature. Although there has been empirical evidence that supports TQM as a universal business strategy; the intensity of effective implementation of its success factors brings operational excellence, but the changing business orientation poses a challenge to TQM as a sustainable strategy for competitiveness.

Based on the previous and having in mind the future research proposals mentioned by authors, it is interesting to examine the simultaneous impact of "soft" and "hard" TQM elements on quality management results. The research hypothesis examined through this study is the following: "soft" and "hard" TQM elements affect the results of adopting a quality management system.

## Methodology

### *Questionnaire*

A research was carried out in Greek companies through questionnaires. Based on the above mentioned "soft" and "hard" TQM elements and the results from their adoption, a questionnaire was designed that was reviewed by quality management academics and professionals and tested through a pilot study on 23 ISO 9001:2000 certified companies. The final questionnaire consisted of four parts. The first part contained questions about the companies' profile and the second part questions about "soft" TQM elements. The questions of the third part concerned the results related to customers, employees, society

and the company itself (internal and external). Finally, the fourth part contained questions using respective quality management tools and techniques. The answers were given on a seven-point Likert scale. Confirmatory Factor Analysis was applied to assess measurement model reliability and validity. The relationships between latent constructs were examined through Structural Equation Modeling. The SPSS 15 and AMOS six statistical packages were used for data processing.

*Sample*

Given that the ISO 9001:2000 standard is much more in line with TQM than other quality standards, the criterion for selecting the companies that would participate in the study was their certification to this standard. The only available and formal source informing data about the ISO 9000 certified Greek companies was ICAP, the largest business information and consulting firm in Greece. According to its database, the ISO 9001:2000 certified companies in Greece during the research period were 1720. The questionnaire was sent to all these companies and was addressed to the quality manager.

In total, 370 questionnaires were returned fully completed. Comparing the 370 companies that participated in the research with the 1350 companies that did not, in terms of the number of employees, head office location and their sector (manufacturing, commercial, service industry), no statistically significant differences were detected (Mann Whittney Test). From this it is concluded that the responded companies were not different from the remaining ISO 9001:2000 certified companies (non-responded) with respect to their profile.

*Testing the assumptions of multivariate analysis*

According to Hair *et al.* (2005), before multivariate data analysis, we should check the assumptions regarding sample size, the scale of variables, their multicollinearity, their multivariate normal distribution and outliers. As far as sample size is concerned, it exceeds 300 cases and is regarded satisfactory for analyses through Structural Equation Modeling (SEM) according to Kline (2005) and Hair *et al.* (2005). According to Garson (2007) and Byrne (2001), we can use Likert scale data and apply the Maximum Likelihood Estimation method in SEM, given that we have a large sample, a seven-point Likert scale and the skewness and kurtosis of variables is within acceptable limits, a fact that suggests distribution symmetry. The multicollinearity among independent variables was excluded after controls were held, according to Kline (2005) and Hair *et al.* (2005), on their correlations ($r < 0.85$) and the multiple regression analysis of every independent variable with all the others ($R^2 < 0.9$, Tolerance $= 1 - R^2 > 0.1$, Variance Inflation Factor $= 1/[1 - R^2] < 10$, Condition Index $< 30$). According to Hair *et al.* (2005), the outliers were identified from a univariate and multivariate perspective (Mahalanobis $D^2$/independent variables $< 3$) and were excluded from the analysis. As far as multivariate normal distribution is concerned and according to Hair *et al.* (2005), there are no serious indications that it is violated (histograms, p-p and q-q plots, skewness and kurtosis $< \pm 1$, standardized residuals $< \pm 2.5$). Therefore, it can be suggested that these basic assumptions are not violated.

## Results

### *Companies profile*

The majority of the companies that participated in the research were small-medium enterprises (< 250 employees), two or three of them were manufacturing having years of experience in quality assurance, since most of them were certified to the standards of the ISO 9000:1994 series. The selection of the certification body and the external quality consultant, on whose support 75 per cent of the companies relied to become certified, was made using their reputation in the market as the primary criterion and not so much on financial grounds. Finally, a rate of 62 per cent of the companies expressed the wish to implement a quality management system in accordance with TQM principles in the future.

### *Confirmatory factor analysis (the measurement model)*

The measured (observed) values for the questions, obtained from the respondents, constitute the measured variables of the model, which are used as the indicators of the respective latent constructs (factors). However, the Confirmatory Factor Analysis revealed some measured variables regarding quality tools and quality management results with a low squared multiple correlation (< 0.5) that were removed from the model. Thus, the final model consists of 18 measured variables that constitute two latent constructs ("soft" TQM – "hard" TQM) and 12 measured variables that constitute three latent constructs (TQM results: customer satisfaction, quality improvement-internal business result and market benefits-external business result), (Table III). The goodness of model fit to the observed data (318 cases) is shown in Table IV.

According to Table III and Hair *et al.* (2005), Standardized Regression Weights are above 0.7 (or at least > 0.5) and the respective Squared Multiple Correlations are above 0.5. This means that factor loadings are satisfactorily large and that a high amount of measured variable's variance is explained by a latent construct.

The reliability of the above latent constructs was checked according to Hair *et al.* (2005), by calculating the Cronbach's alpha coefficients that were higher than 0.7 (Table V). Construct validity was confirmed according to Hair *et al.* (2005), through Confirmatory Factor Analysis by evaluating convergent validity (factor loadings >

| Goodness of fit measures | CFA model | Structural model |
|---|---|---|
| Chi-square | 503.958 | 517.622 |
| Degrees of freedom | 381 | 384 |
| Chi-square/degrees of freedom ($\chi^2$/df) | 1.323 | 1.348 |
| Probability level | 0.00* | 0.00* |
| Root Mean Square of Approximation (RMSEA) | 0.032 | 0.033 |
| Root Mean Square Residual (RMR) | 0.069 | 0.073 |
| Goodness of Fit Index (GFI) | 0.906 | 0.904 |
| Normed Fit Index (NFI) | 0.932 | 0.931 |
| Relative Fit Index (RFI) | 0.923 | 0.921 |
| Incremental Fit Index (IFI) | 0.983 | 0.981 |
| Tucker-Lewis coefficient (TLI) | 0.980 | 0.978 |
| Comparative Fit Index (CFI) | 0.982 | 0.981 |

**Notes**: *According to Hair *et al.* (2005) when $n > 250$, observed variables $m \geq 30$, RMR < 0.08, RMSEA < 0.07, CFI > 0.90

**Table III.**
Goodness of fit measures – measurement model and structural model

| Latent constructs | Observed variables | Standardized regression weights | Squared multiple correlations |
|---|---|---|---|
| "Soft" TQM elements ($X_1$) | Top management commitment | 0.781 | 0.610 |
| | Strategic quality planning | 0.810 | 0.656 |
| | Employee involvement | 0.671 | 0.451 |
| | Supplier management | 0.559 | 0.313 |
| | Customer focus | 0.674 | 0.454 |
| | Process orientation | 0.740 | 0.548 |
| | Continuous improvement | 0.793 | 0.629 |
| | Facts-based decision making | 0.746 | 0.557 |
| | Human resource development | 0.747 | 0.557 |
| "Hard" TQM elements ($X_2$) | Cause and effect diagram | 0.730 | 0.532 |
| | Scatter diagram | 0.791 | 0.626 |
| | Affinity diagram | 0.859 | 0.738 |
| | Relations diagram | 0.852 | 0.726 |
| | Force-field analysis | 0.903 | 0.816 |
| | Run chart | 0.841 | 0.707 |
| | Control charts | 0.794 | 0.631 |
| | Quality function deployment | 0.812 | 0.660 |
| | Failure mode and effect analysis | 0.743 | 0.552 |
| Quality improvement ($X_3$) | End product defects are reduced | 0.862 | 0.744 |
| | Obsolete products are reduced | 0.898 | 0.806 |
| | Non-conformances are reduced | 0.877 | 0.769 |
| | Reprocessing is reduced | 0.852 | 0.726 |
| | Warranty compensations are reduced | 0.699 | 0.489 |
| Market benefits ($X_4$) | Profit has increased | 0.698 | 0.487 |
| | Competitive position has improved | 0.870 | 0.756 |
| | Performance has improved | 0.895 | 0.801 |
| | Sales have increased | 0.789 | 0.623 |
| Customer satisfaction ($X_5$) | The number of customer complaints has decreased | 0.808 | 0.653 |
| | Customer satisfaction has diachronically improved | 0.896 | 0.803 |
| | Customers are retained and are loyal to the company | 0.593 | 0.352 |

**Table IV.**
Confirmatory factor analysis

| Latent constructs | Cronbach's alpha | Average variance extracted * | Construct reliability ** | $(\text{Corr})^{2}$ *** |
|---|---|---|---|---|
| $X_1$ | 0.902 | 0.531 | 0.910 | 0.389 |
| $X_2$ | 0.947 | 0.655 | 0.947 | 0.108 |
| $X_3$ | 0.923 | 0.707 | 0.923 | 0.486 |
| $X_4$ | 0.895 | 0.667 | 0.888 | 0.403 |
| $X_5$ | 0.792 | 0.603 | 0.816 | 0.486 |

**Notes**: *$\text{AVE} = \Sigma\lambda i^2/n$ $(i = 1 \ldots n, \lambda =$ standardized factor loadings, $i =$ observed variables); **$\text{CR} = (\Sigma\lambda i)^2/[(\Sigma\lambda i)^2 + (\Sigma\delta i)]$, ($\lambda i =$ standardized factor loading, $i =$ observed variables, $\delta i =$ error variance); ***: the highest squared correlation between factor of interest and remaining factors

**Table V.**
Model reliability and validity

0.7-0.5, Average Variance Extracted > 0.5, Construct Reliability > 0.7), discriminant validity (Average Variance Extracted > $Corr^2$), (Table V), face-content validity (literature review, questionnaire review by academics and quality professionals) and nomological validity (significant correlations among latent constructs and between them and an independent variable, which they predict satisfactorily, *R*-square = 0.644).
Cross-validation was used to make a second confirmation of the measurement model. So we randomly split the initial data sample ($n = 318$) into two groups ($n_1 = 159$ and $n_2 = 159$) and examined the goodness of model fit to the two groups. According to Hair *et al.* (2005), we applied a series of progressively more rigorous tests across samples (Table VI), which confirmed the measurement's model validity.

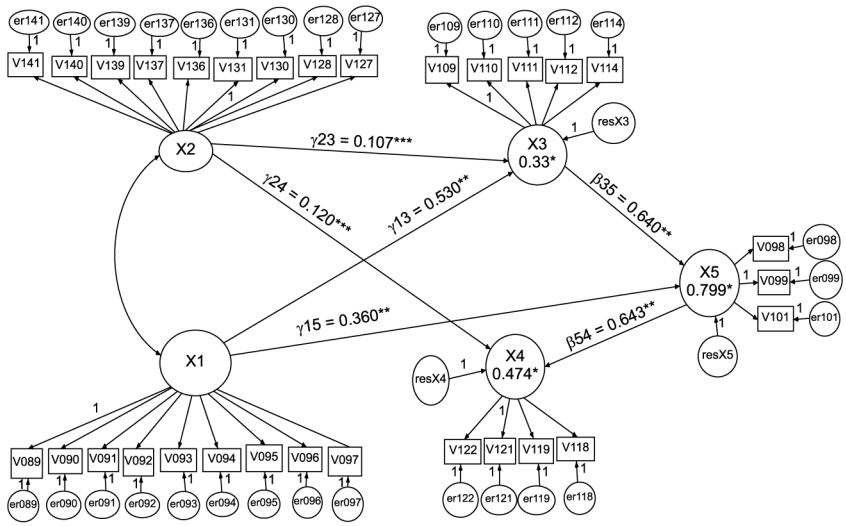
*The structural model*

Having examined the measurement model reliability and validity, we determined the relationships between the latent constructs, as it is presented in Figure 1 and then we

| Model description | $X^2$ | df | *p* | RMSEA | CFI | $\Delta\chi^2$ | $\Delta$df | *p* |
|---|---|---|---|---|---|---|---|---|
| Group 1 | 480.7 | 381 | 0 | 0.041 | 0.97 | | | * |
| Group 2 | 560.2 | 381 | 0 | 0.055 | 0.95 | | | * |
| Factor structure equivalence | 1040.9 | 762 | 0 | 0.034 | 0.96 | | | * |
| Factor loading equivalence | 1076.3 | 787 | 0 | 0.034 | 0.96 | 35.3 | 25 | > 0.001** |
| Interfactor covariance equivalence | 1081.5 | 797 | 0 | 0.034 | 0.96 | 5.1 | 10 | > 0.001** |
| Error variance equivalence | 1129.7 | 827 | 0 | 0.034 | 0.95 | 48.2 | 30 | > 0.001** |

**Notes**: *Good fit; **Insignificant

**Table VI.**
Cross-validation




**Note:** *: $R^2$, $\beta$ = standardized regression weights between endogenous constructs, $\gamma$ = standardized regression weights between exogenous and endogenous construct **: statistically significant regression weight in $p = 0.001$, ***: statistically significant regression weight in $p = 0.05$

**Figure 1.**
The structural model

examined the goodness of model fit to the observed data. According to Hair *et al.* (2005), we initially compared the structural model with the CFA model in terms of Standardized Regression Weights (nontrivial, differences $< 0.05$, non-statistically significant – Wilcoxon Singed Ranks Test). In Table IV it is observed that the structural model provides a good overall fit, while as far as goodness of fit indices are concerned, we conclude that there are no significant differences with the respective indices of the CFA model. Figure 1 presents the statistically significant relationships and the variance explained for the endogenous constructs.

From this figure it is obvious that "soft" and "hard" TQM elements have both a direct and indirect impact on the quality management results. More specifically, "quality improvement" is influenced mainly by "soft" TQM elements and secondarily by "hard" TQM elements. Customer satisfaction is influenced mainly by "quality improvement" and secondarily by "soft" TQM elements. "Market benefits" are influenced mainly by "customer satisfaction" and secondarily by "hard" TQM elements. From the above mentioned it is concluded that quality management results are significantly influenced mainly by "soft" TQM elements and secondarily by "hard" TQM elements. In other words, the research hypothesis, that is "soft" and "hard" TQM elements affect the results of adopting a quality management system, is not rejected.

## Discussion

Taking the profiles of the companies participating in the study into account, we can conclude that they are characterized by a desire to pursue quality, given that most of them started their journey towards quality before the revision of the ISO 9000 standard in the year 2000. Thus, by implementing the ISO 9000:1994 and mostly the revised ISO 9001:2000 standards, the foundations are laid for the future implementation of other quality standards, such as Health and Safety (OHSAS 18001) and Environmental (ISO 14001). Furthermore, if we take into account the willingness of most companies to incorporate the TQM principles into their quality system, we cannot but talk about a hopeful future for quality management. On the contrary, in the study of Coleman and Douglas (2003), the majority of the organizations viewed ISO 9000 as the end of their quality journey.

However, we should stress that the quality management attempts made by companies individually are not sufficient. To satisfy the end customer – consumer, quality should be ensured outside companies as well, that is throughout the distribution network. Therefore, after quality is firmly founded inside companies, we should turn our attention to the way quality is managed among companies-wholesalers-retailers. The authors believe that TQM can guarantee quality within the companies, but also throughout the supply chain.

Results showed that both aspects of TQM – the "soft" and the "hard" side – play a significant role in gaining benefits from the quality management system, both inside and outside the business environment. However, it becomes evident that "soft" TQM elements play a major role, while the role of quality management tools is inferior, yet not insignificant. The consolidation of the company's market position seemed to be significantly determined by the degree of customer satisfaction, while it is also directly affected by quality tools to a lesser degree. But customer satisfaction requires the company's quality improvement and the adoption of TQM principles, such as customer focus and the measurement of customer satisfaction. Based on the results of this study, the adoption of "soft" and "hard" TQM elements can lay the foundations for improving the way a company operates and hence its quality.

The result of the present study regarding the more significant role of "soft" TQM elements compared to "hard" TQM elements, is consistent with that of Lagrosen and Lagrosen (2005), who indicated that the functioning of a company's quality management system depends, to a significant degree, on the use of quality management models such as ISO, EFQM, MBNQA and the level of adoption of three quality management principles (continuous improvement, management by facts and participation of everybody). Moreover, in the study conducted by Ahmed *et al.* (2005), a small rate of companies considered quality tools as the most important element in a TQM system, contrary to top management commitment and customer orientation. Ahmed and Hassan (2003), given that their study revealed a limited use of quality tools and mainly the Statistical Process Control, recommend that companies widely accept quality practices that are incorporated into everyday practice and realize the advantages coming from quality tools implementation so that they can achieve business performance improvement.

Tari (2005) indicated that, in order to progress towards TQM, ISO 9000 certified firms must improve their people orientation and use quality improvement tools and techniques to a higher extent, even if, in contrast to our study, the factors related to the hard part were more implemented.

The significant effect of implementing a quality system according to "soft" TQM elements on customer satisfaction and the company's position in the market, as it became evident in the present study, is consistent with the results coming from the study of Agus *et al.* (2000). They found that implementing "soft" TQM elements contributes to improved customer satisfaction, which in turn results in financial performance improvement. Prajogo and Sohal (2003) found that the effects of the TQM system on product and process quality and innovation are important.

The significant effect of "soft" TQM elements on quality improvement, which was proved in the present research, is consistent with the result of Prajogo's study (2005), which showed that TQM principles adoption by services and manufacturing companies, significantly promotes product quality improvement in terms of reliability, performance, duration and conformance to requirements. Finally, the meta-analysis results of Jitpaiboon and Rao (2007) revealed that "soft" TQM elements are significantly associated with the results in the internal and external business environment.

## Conclusions

Obtaining a competitive advantage that ensures the company's sustainability and dominance in the market, by means of satisfying its customers and substantially improving its quality, is significantly affected by "soft" TQM elements and the implementation of quality management tools and techniques. However, tools are only the "vehicle" to quality improvement. Quality tools usage alone can not lead a company to continuous process improvement, customer satisfaction and consolidation of its market position, without the proper guidance by top management and employee and supplier support.

However, in the present study there are limitations. Data constitute subjective business evidence that came from quality managers, a fact that entails the risk of receiving biased answers. It is also a research conducted on companies from all sectors and the proposed model has not been checked for its validity in separate sectors, due to the limited number of companies per sector. However, this can be the subject of a future research. We would also suggest conducting a future research on companies with the purpose of collecting primary data on TQM that will be subjective and will be based on

the opinions of more than one person per company including employees, as well as objective data that would be based on the company's financial indicators.

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