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Comparative Analysis of Malcolm Baldrige National Quality Award Criteria: An Empirical Study of India, Mexico, and the United States

Marc Schniederjans, Mahour Mellat Parast, Majid Nabavi, S. Subba Rao,
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The Impact of Employees' Characteristics on Total Quality Service Implementation: An Empirical Study

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Comparing Quality Management Practices between the United States and Mexico

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Comparing Quality Management Practices between the United States and Mexico

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The purpose of this article is to compare quality management practices in the United States and Mexico. The survey instrument used was based on the Malcolm Baldrige National Quality Award (MBNQA) criteria. The results show that social aspects of quality, including quality citizenship and quality responsibility, are different in the United States and Mexico. Furthermore, the results of the regression analysis show that there are differences between the critical success factors of quality management practices within the United States and Mexico. In both countries, general matters (social responsibility) and supplier quality were significant in explaining variability of quality results. More similarities in both countries were found in the effect of quality management practices on customer focus and satisfaction, where general matters (social responsibility), strategic planning process for quality management, and quality assurance of products or services were statistically significant variables explaining variability of customer focus and satisfaction. This research concludes that supplier quality, strategic planning process of quality management, and social aspects significantly affect quality success factors and customer satisfaction in both countries. Recommendations for implementing quality management in the United States and Mexico are provided.

Key words: international comparative study, Malcolm Baldrige National Quality Award criteria, quality management

INTRODUCTION

Globalization and international trade, along with advances in information technology, have dramatically increased competition worldwide. To compete in a global market, firms must be equipped with the latest technology, up-to-date information, skilled employees, and advanced managerial skills.

The concept of total quality management (TQM) developed as a result of intense global competition. Companies with international trade and global competition have paid considerable attention to TQM philosophies, procedures, tools, and techniques. The importance of international quality management research first appeared in the *Journal of Decision Sciences* (Kim and Chang 1995). However, little empirical research has been conducted on international quality management (Rao, Solis, and Raghu-Nathan 1999), especially in the cross-cultural arena (Sila and Ebrahimpour 2003). While most quality management research has focused on comparing practices in the United States and Japan in early 1990, recent quality management research has been extended to other countries and regions around the world (Rao, Solis, and Raghu-Nathan 1999). Most of these studies, however, use different instruments and constructs for comparing quality management practices across countries. Accordingly, the need to develop instruments for comparing quality management practices across countries based on a generic and acceptable framework for quality management is clear.

The development of the Malcom Baldrige National Quality Award (MBNQA) model as a basis

for quality management practices and research has gained attention in recent years in the United States (Garvin 1991; Corkovic et al. 2000; Bell and Elkins 2004; Stephens, Evans, and Matthews 2005). The application of the MBNQA is not limited to the United States. The universality of the MBNQA and its relationship to many quality management constructs has made it a useful framework for studying quality management practices (Samson and Terziovski 1999). In fact, most national and international quality awards have been influenced by the MBNQA criteria (Ettore 1996; DeBalyo 1999), including the European Quality Award, the Mexican National Quality Award, the Brazilian National Quality Award, the Egyptian Quality Award, and the Japanese Quality Award. Accordingly, cross-cultural comparison of quality management based on the MBNQA criteria could be helpful in understanding how countries view quality management practices.

The purpose of this article is to compare quality management practices in the United States and Mexico, based on the MBNQA. More specifically, this research focuses on understanding the similarities and differences of quality management practices in the United States and Mexico, as well as the critical success factors.

LITERATURE REVIEW

The importance of TQM in manufacturing and service organizations has increased significantly over the past 20 years. Firms with international trade devote special attention to the tools and techniques recommended by quality management experts. Early studies on international quality practices were mainly focused on developed countries such as the United States and Japan (Benson, Sarah, and Schroeder 1991; Ebrahimpour and Johnson 1992; Garvin 1986; Flynn 1992; Reitsperger and Daniel 1991; Richardson 1993; Rogers 1993; Knotts and Tomlin 1994; Khoo and Tan 2003). Moreover, the empirical literature has extended its scope by studying and comparing quality management practices in other developed and developing countries, such as the United States and Taiwan (Madu, Kuei, and Lin 1995; Solis et al. 1998); Asia and the South Pacific (Corbett et al. 1998),

Japan, Korea, and Denmark (Dahlgaard 1990); the East and West (Russia, Taiwan, Japan, Korea, Finland, Estonia, Denmark, India, Sweden, England, and New Zealand) (Dahlgaard, Kanji, and Kristensen 1998); Costa Rica and the United States (Tata, Parasad, and Motwani 2000); the United States, Mexico, China, and India (Quazi, Hing, and Meng 2002); the United States and Mexico (Burgos Ochoategui 1998); Canada and Mexico (Galperin and Lituchy 1999); the UK and Ireland (McAdam and Jackson 2002); and the West, East, and Russia (Selivanova and Eklof 2001). Most of these studies attempt to understand the critical success factors of TQM. Because of a lack of development of valid instruments, the results of such studies cannot be generalized, yet they provide insights about quality management in the international context. As Sila and Ebrahimpour (2003) indicate, the question regarding the universality of quality management practices has not been answered and more empirical, cross-country, and industry-specific research is needed in quality management.

The universality of the MBNQA and its relationship to quality management constructs has made it a useful framework for studying quality management practices. Samson and Terziovski (1999) state:

“Although there are always going to be debates about how to categorize elements of a holistic process and framework like TQM, it is necessary to decompose it in some way to facilitate analysis. Since the most pervasive and universal method has been awards criteria such as the MBNQA, we have chosen to follow that framework.”

Despite the application of the MBNQA criteria in practice, few theoretical or empirical studies have been reported in the literature, especially in the international context. Initial application of the MBNQA model as a framework for identifying quality management constructs was described by Steeples (1992). Previous research on quality management in the international context has proved the universality and applicability of MBNQA in comparative quality management studies (Rao, Raghu-Nathan, and Solis 1997; Rao, Solis, and Raghu-Nathan 1999; Prajogo 2005). Rao et al. (1998), Rao, Raghu-Nathan, and Solis (1997), and

Rao, Solis, and Raghu-Nathan (1999) compared quality management practices in different countries. They found that top management support is a significant factor influencing strategic quality planning, human resource development, supplier quality, quality results, and customer orientation practices. They found significant relationships between top management support and all of the quality management practices and results: information and analysis, strategic quality planning, human resource development, quality assurance, supplier relationship, customer focus and orientation, and quality results.

In summary, previous research supports the applicability of the MBNQA criteria in comparative analysis of quality management practices in the international context. The models developed by Rao, Raghu-Nathan, and Solis (1997), Rao et al. (1998), and Rao, Solis, and Raghu-Nathan (1999) have resulted in the development of a set of reliable and valid instruments that can be used in comparative quality management practices.

THEORETICAL FRAMEWORK: COMPARATIVE MANAGEMENT

Traditionally, research in comparative management fits within three schools of thought (Corbett et al. 1998): culture free (Haire, Ghiselli, and Porter 1966), convergence (Form 1979), and culture specific (Hofstede 1980). In this article a culture-free perspective is employed, indicating that, based on the MBNQA criteria, there is no difference between quality management practices in the United States and Mexico.

Despite the development of different TQM models, little conceptualization has been done on quality management in the international and global context. The international quality management model, developed by Rao, Solis, and Raghu-Nathan (1999), is the only quality management model that has been developed, verified, and tested in the international context. The instrument consists of nine dimensions for quality management:

1. **Quality leadership** (QL): Addresses the critical role of management in driving companywide

quality management efforts (Flynn et al. 1994; Puffer and McCarthy 1996).

2. **Quality information and analysis** (QIA): Refers to the availability of information systems in the company, and the procedures and systems that provide accurate and timely information for the managers to make quality decisions (Flynn, Schroeder, and Sakakibara 1994).
3. **Strategic planning process of quality management** (SPP): Incorporates the integration of quality and customer satisfaction issues into strategic and operational plans, which allows firms to set clear priorities, establish clear target goals, and allocate resources for the most important things (Godfrey 1993).
4. **Support for human resource development** (SHRD): Emphasizes the essential role of employee training and their involvement in quality-related decisions in the company (Rao, Raghu-Nathan, and Solis 1997).
5. **Quality assurance of products and services** (QAP): Refers to the systematic approach used by organizations for maintaining and improving the quality of their products and services (Rao, Raghu-Nathan, and Solis 1997).
6. **Supplier quality** (SQ): Acknowledges the importance of suppliers in achieving higher levels of quality in an organization (Flynn, Schroeder, and Sakakibara 1994).
7. **Quality results** (QR): Indicates how much internal operations, customer satisfaction, and market and financial performances in the company have been improved by quality management practices (Steeple 1992; Juran 1993).
8. **Customer focus and satisfaction** (CFS): Specifies how much the company evaluates the feedback from its customers in improving quality (Schonberger 1994).
9. **General matters** (social responsibility) (GM): Stresses the practice of the company's responsibility and its social role in society, such as improvement of education, safety, and healthcare in the community (Florida 1996).

HYPOTHESES

According to the culture-free approach in comparative management study, differences in cultural practices do not affect the practice of quality in organizations. Therefore, the following hypotheses have been developed:

- H1: There is no difference in quality leadership for quality management between the United States and Mexico.
- H2: There is no difference in quality information and analysis for quality management between the United States and Mexico.
- H3: There is no difference in the strategic planning process for quality management between the United States and Mexico.
- H4: There is no difference in support of human resource development and management for quality management between the United States and Mexico.
- H5: There is no difference in quality assurance for products and services for quality management between the United States and Mexico.
- H6: There is no difference in supplier quality for quality management between the United States and Mexico.
- H7: There is no difference in quality results for quality management between the United States and Mexico.
- H8: There is no difference in customer focus and satisfaction for quality management between the United States and Mexico.
- H9: There is no difference in general matters (social responsibility) for quality management between the United States and Mexico.

RESEARCH METHODOLOGY

Survey Instrument

Survey research is the methodology adapted for this article. Surveys provide an important source of basic scientific knowledge, and surveys are powerful methods

for obtaining information about many aspects of a problem. The type of survey used in this research was a written mail questionnaire, which reduces bias, and the researchers' opinions will not influence the respondents' answers. This is especially true for studies involving large sample sizes and large geographic areas.

The following steps were used to develop and validate the measurement instrument (Rao, Solis, and Raghu-Nathan 1999). First, the theoretical dimensions underlying quality practices were conceptualized. While the 1992 version of the MBNQA model with seven constructs was used as a starting point for developing the survey, the instrument has been tested, modified, and refined in different stages to reflect all aspects of quality management. The final instrument, which was used in data collection, has nine constructs (see Appendix). A questionnaire was developed to measure these constructs. The same questionnaire was used to collect data from the United States and Mexico, and a five-point Likert scale was used to measure the items.

Table 1 Group statistics.

Group	N	Mean	Std. deviation	Std. error mean
QL	113	2.82035	0.787986	0.74127
	258	2.67946	0.693048	0.43147
QIA	113	2.46637	0.733218	0.68975
	258	2.51512	0.648947	0.40402
SPP	113	2.50000	0.638217	0.60038
	258	2.41705	0.590604	0.36769
SHRD	113	3.10265	0.935172	0.87974
	258	3.25581	0.847694	0.52775
QAP	113	3.67345	0.767070	0.72160
	258	3.58992	0.705437	0.43919
SQ	113	2.98496	0.780250	0.73400
	258	3.02481	0.722354	0.44972
QR	113	3.55498	0.904062	0.85047
	258	3.44845	0.748031	0.46570
CFS	113	2.86549	0.70978	0.66771
	258	2.84410	0.69315	0.37551
GM	113	2.54159	0.722313	0.67950
	258	2.72093	0.607947	0.37849

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Table 2 Correlation matrix.

	QL	QIA	SPP	SHRD	QAP	SQ	QR	CFS	GM
QL									
Pearson Correlation	1								
Sig. (2-tailed)	—								
N	371								
QIA									
Pearson Correlation	.679	1							
Sig. (2-tailed)	.001	—							
N	371	371							
SPP									
Pearson Correlation	.831	.693	1						
Sig. (2-tailed)	.001	.001	—						
N	371	371	371						
SHRD									
Pearson Correlation	.704	.689	.714	1					
Sig. (2-tailed)	.001	.001	.001	—					
N	371	371	371	371					
QAP									
Pearson Correlation	.639	.655	.623	.595	1				
Sig. (2-tailed)	.001	.001	.001	.001	—				
N	371	371	371	371	371				
SQ									
Pearson Correlation	.852	.656	.576	.610	.671	1			
Sig. (2-tailed)	.001	.001	.001	.001	.001	—			
N	371	371	371	371	371	371			
QR									
Pearson Correlation	.651	.605	.618	.630	.655	.685	1		
Sig. (2-tailed)	.001	.001	.001	.001	.001	.001	—		
N	371	371	371	371	371	371	371		
CFS									
Pearson Correlation	.721	.655	.749	.687	.709	.677	.723	1	
Sig. (2-tailed)	.001	.001	.001	.001	.001	.001	.001	—	
N	371	371	371	371	371	371	371	371	
GM									
Pearson Correlation	.641	.592	.631	.726	.588	.620	.619	.765	1
Sig. (2-tailed)	.001	.001	.001	.001	.001	.001	.001	.001	—
N	371	371	371	371	371	371	371	371	371

All correlations are significant at the 0.01 level (2-tailed).

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Data Collection

Data were collected from the United States and Mexico to study the relationship between the quality practices across the two countries (Rao, Solis, and Raghu-Nathan 1999). The population of the study in the United States consisted of a random sample of quality managers and professionals who are members of the American Society

for Quality (ASQ). A total of 1500 surveys were mailed, and 258 completed surveys were received (a response rate of 17 percent). In Mexico, a list of manufacturing companies was obtained from the Monterrey Institute of Technology from which a random sample of 200 firms was taken. Out of 200 surveys, 113 completed surveys were received (a response rate of 56 percent). The results from the survey were analyzed using SPSS software.

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Table 3 Test of equality of variances and means.

Variables	Levene's Test for Equality of Variances		t-test for equality of means				
	F	Sig.	t	df	Sig.	Mean difference	Std. error difference
QL	Equal variances assumed	2.370	.125	1.727	369	.085	1.4090
	Equal variances not assumed		1.643	191		.102	.81580 .85770
QIA	Equal variances assumed	4.088	.044	-.640	369	.523	-.4874
	Equal variances not assumed		-.610	192		.543	.76217 .79937
SPP	Equal variances assumed	1.241	.266	1.214	369	.225	.8295
	Equal variances not assumed		1.178	199		.240	.68299 .70403
SHRD	Equal variances assumed	3.663	.056	-1.55	369	.122	-1.5316
	Equal variances not assumed		-1.49	196		.137	.98726 1.02589
QAP	Equal variances assumed	3.178	.075	1.022	369	.308	.8353
	Equal variances not assumed		.989	198		.324	.81751 .84474
SQ	Equal variances assumed	2.597	.108	-.477	369	.643	-.3985
	Equal variances not assumed		-.463	199		.643	.83523 .86081
QR	Equal variances assumed	9.46	0.002	1.171	369	.242	1.0553
	Equal variances not assumed		1.088	182		.278	.90090 .96963
CFS	Equal variances assumed	3.729	.054	.307	369	.759	.4415
	Equal variances not assumed		.288	184		.774	1.43808 1.53211
GM	Equal variances assumed	5.495	.020	-2.46	369	.014	-1.7943
	Equal variances not assumed		-2.04	185		.022	.72739 .77780

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ANALYSIS AND RESULTS

Group Comparison

Based on the MBNQA model, quality management constructs were operationalized on a five-point Likert scale. Group statistics show each construct, its mean, and the standard deviation. For all constructs, reliability values are greater than 0.88, which is acceptable for this kind of research compared to minimum recommended value of 0.7 (Rao, Solis, and Raghu-Nathan 1999).

The mean and standard deviation of each construct was calculated (see Table 1). Then, the correlation between the constructs was determined. It shows that all of the constructs are significantly correlated at $\alpha = 0.01$ (see Table 2).

A t-test was used to investigate the similarities and differences of quality management practices between the United States and Mexico. It was assumed that the

variability of the two groups was equal. The authors tested this at $\alpha = 0.05$ level using the Levene's test. They used Levene's test since it is not sensitive to the sample distribution. They wanted the p-value to be greater than alpha of 0.05.

Table 3 shows the Levene's Test for Equality of Variances. Because the tests have inverse pairings (large sample size with small standard deviation, and small sample with large standard deviation) t-tests that violate the assumption of equality of variance (EOV) should not be trusted or used. Alternatively, the authors had the option to use nonparametric test or Welch t-test, or Welch or Brown-Forsythe (WBF) test, which does not make the assumption (Hinkle et al. 1994). Variables that they are concerned about include the general matters (GM), quality assurance of products and services (QAP), and quality information and analysis (QIA). (They do not have the same variance, so they do not meet the assumption for

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Table 4 Robust test of equality of means.

		Statistic	df1	df2	Sig.
GM	Welch	5.316	1	184	0.022
	Brown-Forsythe	5.316	1	184	0.022
QAP	Welch	1.185	1	182	.278
	Brown-Forsythe	1.185	1	182	.278
QIA	Welch	.372	1	192	.543
	Brown-Forsythe	.372	1	192	.543

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using t-test). Therefore, to compare the two groups (United States and Mexico) one can use the Welch or Brown-Forsythe test, which is not sensitive to the equality of variance assumption and allows one to compare the two group means on the given dependent variables (here three constructs of quality management). Table 4 shows the Welch or Brown-Forsythe test for GM, QAP, and QIA.

The authors used the Welch or Brown-Forsythe test to compare the means of the three variables that did not meet the assumption of normality. As Table 4 indicates, the results show that there is a significant difference in the general matters of quality (social responsibility) between the United States and Mexico. Accordingly, H9 is rejected. There is not enough evidence, however, to reject H2 and H5.

For testing the means of the six other constructs of quality management, a t-test was used. As Table 3 shows, none of the F-values are significant. Accordingly, at $\alpha = 0.05$ there is not enough evidence to reject H1, H2, H3, H4, H5, H6, H7, and H8.

Regression Analysis

It is important to determine the critical success factors for quality management in the United States and Mexico. Sila and Ebrahimpour (2003) address the importance of identifying critical success factors that affect firm performance. To do so, the authors defined quality results and customer satisfaction as two outcomes (dependent variables) of quality management practices. Regression analysis (stepwise regression) was used to determine the variables that are statistically significant in explaining variability of quality results and customer satisfaction.

Table 5 Regression analysis on quality results (Mexico).

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.769 ^a	.592	.588	5.80180
2	.824 ^b	.679	.673	5.16755
3	.836 ^c	.699	.691	5.02370
4	.834 ^d	.711	.700	4.95346

a. Predictors: (Constant), QAP

b. Predictors: (Constant), QAP, GM

c. Predictors: (Constant), QAP, GM, SQ

d. Predictors: (Constant), QAP, GM, SQ, SHRD

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Table 6 Regression analysis on quality results (U.S.).

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.654 ^a	.427	.425	5.67171
2	.707 ^b	.500	.496	5.31023
3	.723 ^c	.523	.518	5.19458
4	.730 ^d	.533	.525	4.15427

a. Predictors: (Constant), SQ

b. Predictors: (Constant), SQ, QL

c. Predictors: (Constant), SQ, QL, QIA

d. Predictors: (Constant), SQ, QL, QIA, GM

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Quality Results as the Dependent Variable

In Mexico, the results of a stepwise regression showed that quality assurance of products and services (QAP), general matters (GM), supplier quality (SQ), and support for human resource development (SHRD) explain more than 70 percent of the variability in quality results ($R^2 = 0.711$), which is very good predictability (see Table 5).

Using the same analysis, the results for the United States showed that supplier quality (SQ), quality leadership (QL), quality information availability (QIA), and general matters (social responsibility) (GM), account for more than 53 percent of variability

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in quality results (see Table 6). Comparing the results of the two models, it was found that while there is a difference in the critical success factors between the United States and Mexico, supplier quality and general matters (social responsibility) emerged as the common variables in both countries influencing quality results.

Customer Focus and Satisfaction as the Dependent Variable

Organizations attempt to achieve higher levels of customer satisfaction as the result of their quality management practices (Dean and Bowen 1994; Wilson and Collier 2000; Agus 2004; Noh, Park, and Park 2004). Recent studies show that a higher level of customer satisfaction reduces operating costs and increases profitability and organizational performance (Anderson, Fornell, and Lehmann 1994; Lee and Hwan 2005; Matzler et al. 2005; Westlund et al. 2005). Accordingly, a stepwise regression was performed to determine the effect of quality management practices on customer satisfaction.

The results of the regression analysis (see Table 7) for the data in Mexico show that general matters (social responsibility) (GM), quality assurance of products/services (QAP), and strategic planning process for quality management (SPP) are significant predictors of customer satisfaction, which account for 80 percent of the variability in the customer satisfaction ($R^2 = 0.805$).

In the case of the United States, the results of the stepwise regression analysis show that the strategic planning process of quality management (SPP), general matters (social responsibility) (GM), quality assurance of products/services (QAP), and supplier quality (SQ) are significant predictors of customer satisfaction. The model explains 72.2 percent of variability of customer focus and satisfaction, which indicates good predictability of the model (see Table 8).

Overall, it was found that customer focus and satisfaction was affected by social responsibility, quality assurance of products, and strategic planning process of quality management in both countries.

Table 7 Regression analysis on customer focus and satisfaction (Mexico).

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.864 ^a	.716	.713	7.60141
2	.888 ^b	.789	.786	6.57341
3	.879 ^c	.805	.799	6.35767

a. Predictors: (Constant), GM

b. Predictors: (Constant), GM, QAP

c. Predictors: (Constant), GM, QAP, SPP

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Table 8 Regression analysis on customer focus and satisfaction (U.S.).

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.732 ^a	.537	.535	8.22822
2	.823 ^b	.677	.675	6.87863
3	.843 ^c	.711	.708	6.51891
4	.850 ^d	.722	.718	6.41072

a. Predictors: (Constant), SPP

b. Predictors: (Constant), SPP, GM

c. Predictors: (Constant), SPP, GM, QAP

d. Predictors: (Constant), SPP, GM, QAP, SQ

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DISCUSSION

The findings of this research show that there is no difference between the quality management practices in the United States and Mexico, based on the MBNQA criteria. This indicates that quality management practices are universal and context-free, which could support the generalizability of quality management practices. This is in line with Spencer (1994), who indicates, "Quality management recommendations tend to be universal." While these findings support the generalizability of quality management practices, the authors cannot make a firm argument that quality management practices are context free. The significant difference in general matters (social responsibility) between the United States and Mexico indicates that social differences

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may affect the practice of quality management. More research, especially in cross-cultural settings, is required to confirm the validity of this argument.

The significant difference in social responsibility between the United States and Mexico might be related to the difference in the cultures of the two countries, where national culture affects quality management practices (Galperin and Lituchy 1999; Flynn and Saladin 2000). More qualitative research, especially case study, is needed to investigate how social responsibility is different in the two countries and how such differences affect the practice of quality management.

The results of the regression analysis reveal that, despite the difference in the effect of quality management practices in the United States and Mexico, supplier quality is an important predictor of quality results in both settings. This is in line with the recent trend in the role of quality in supply chain management, which demonstrates how the supplier quality can affect the quality of products or services provided by the firm (Robinson and Mahlotra 2005). The results indicate such a trend, which supports the fact that supplier quality is an important aspect of quality results. Furthermore, general matters (social responsibility) was a common indicator between two courtiers that emerged as a significant variable. Taking into account the fact that both supplier quality and social responsibility are statistically significant in explaining variability of quality results in the United States and Mexico, the findings provide new directions and research for quality management. In that regard, a broader view of quality management needs to be employed for investigating the effects of quality management on firm performance. Such a perspective on quality management must capture both the internal side of quality (inside of the firm) and the external side of quality (the social aspect of quality, which relates to the interaction of the firm with other organizations).

The authors' findings support the fact that the "soft side" of quality management, such as social responsibility and support for human resource development, are important predictors of quality results in the United States and Mexico. Building upon the resource-based view of the firm, Powell (1995) empirically shows that TQM provides sustainable competitive

advantage to the firms. However, such an advantage is not generated through TQM tools and techniques such as benchmarking, process improvement, and statistical quality control but through certain tacit, behavioral, and imperfectly imitable sources such as culture, organizational skills, and empowerment. The authors' findings provide two kinds of advantages that are nonimitable and firm specific that affect quality results of firms.

Regression analysis on the effect of quality management practices on customer satisfaction revealed that general matters (social responsibility), strategic planning of quality management process, and quality assurance of products and services are statistically significant variables explaining variability in customer satisfaction in both countries. A simple interpretation of this finding is that customer satisfaction is affected by similar variables in both countries. The only difference is the significance of supplier quality in the United States. This might be due to the fact that U.S. companies have paid more attention to the importance of supplier quality in the overall performance of the firm as well as customer satisfaction.

In terms of translating the findings to quality management practices in the United States and Mexico, several recommendations can be made. Based on the significance in the results of the societal responsibility, managers must recognize and appreciate the differences in the social systems and management practices in the United States and Mexico. For a U.S. company that has operations in Mexico the significance of the results in social responsibility indicate a better understanding of the social and cultural system in Mexico. Accordingly, U.S.-based firms with operations in Mexico need to understand the social system in Mexico so they can tailor their quality management practices accordingly. From the perspective of firms in the United States with a high percentage of Mexican (Hispanic) employees, it is important to understand the value and cultural system. For example, age and gender play a significant role in the Mexican culture (Pelled and Xin 2000); Mexican culture discourages male submission to females (Teagarden, Butler, and Von Ginow 1992), which is not the case in the American culture. Because of the differences in the

social system in the United States and Mexico, it is recommended that U.S. employers with a high percentage of Mexican employees incorporate Mexican culture and values in their quality management system.

LIMITATIONS

One of the study's limitations is the unequal sample size of both groups. Despite using rigorous statistical tests for comparing two groups, the difference between sample sizes of the two groups may affect the selection of stronger tests. Additionally, the results of the study cannot be generalized to other regions, since the study was limited to the United States and Mexico.

There is also the issue of multicollinearity, where the independent variables are correlated with each other. The correlation table shows that the independent variables are highly correlated. This is because successful quality management is achieved through interaction and interrelatedness of a group of variables.

RECOMMENDATION FOR FUTURE RESEARCH

As the recommendation for future research, it is appropriate to study quality management practices in different contexts (for example, different industries) and regions such as the Middle East and Africa. Such studies will help in the generalizability of findings. There is also the issue of multicollinearity, where the independent variables are correlated with each other.

As quality management moves beyond its traditional boundaries, its social aspect is gaining more attention. Recent trends toward supply chain management and strategic alliances could be considered as potential areas of research for quality management (Sousa and Voss 2002). In that regard, research in quality management should consider the social aspect of quality such as social responsibility.

CONCLUSION

In this article, a comparative analysis of quality management practices between the United States and

Mexico was conducted, using the MBNQA criteria as a framework. A significant difference between the social aspect of quality in the United States and Mexico was found. This is an indication of the differences between the social systems in the United States and Mexico and their impact on social responsibility as an aspect of quality management practices.

The findings suggest that there is a need to focus more on the behavioral and nonimitable aspects of quality management, such as social responsibility, human resource development, and strategic planning of quality. Firms pursuing quality management need to understand such resources within their firm and attempt to gain a competitive advantage by focusing on such nontransferable and nonimitable sources so they can benefit from implementing quality management.

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APPENDIX

Survey Instrument

Instructions: Please respond to the following questions by circling one of the numbers [1] to [5] or [x] to the right of the question. The numbers represent the strength or degree of your assessment, agreement, perception or opinion, as the case may be, to the question item.

Scale: [x] Unable to respond [5] Very High [4] High [3] Medium [2] Low [1] Very Low

I. The following questions relate to quality leadership in your company/division

Extent to which the top company executive assumes responsibility for quality performance	x 5 4 3 2 1
Acceptance of responsibility for quality by major department heads within the company	x 5 4 3 2 1
Degree of participation by top management in the quality improvement process	x 5 4 3 2 1
Extent to which the top management has objectives for quality performance	x 5 4 3 2 1
Extent to which quality goals are made specific within the company	x 5 4 3 2 1
Importance attached to quality by the top management in relation to cost and schedule objectives	x 5 4 3 2 1
Amount of review of quality issues in the top management meetings	x 5 4 3 2 1
Extent to which the senior management is involved in all activities of the company toward quality excellence	x 5 4 3 2 1

II. The following questions relate to quality information and analysis in your company/division

Availability of quality data (error rates, defect rates, scrap, rework, returns, etc.)	x 5 4 3 2 1
Extent to which necessary quality data are available on time	x 5 4 3 2 1
Extent to which necessary quality data are available to hourly employees	x 5 4 3 2 1
Extent to which quality data are available to managers and supervisors	x 5 4 3 2 1
Extent to which quality data are used by top management in decision making	x 5 4 3 2 1
Extent to which quality data are used by middle management in planning and controlling	x 5 4 3 2 1
Extent to which quality data are used by hourly workers in their operations	x 5 4 3 2 1
Extent to which quality data and information are available and used in your company/division	x 5 4 3 2 1

III. The following questions relate to strategic planning process of quality management in your company/division

Extent to which quality management is considered in the company/division strategic plan	x 5 4 3 2 1
Extent to which quality management is considered in the operational plan (1-2 years)	x 5 4 3 2 1
Extent to which customer satisfaction is considered in the company/division strategic plan	x 5 4 3 2 1
Extent to which customer satisfaction is considered in the operational plan (1-2 years)	x 5 4 3 2 1
Extent to which the top management supports long-term quality improvement process	x 5 4 3 2 1
Extent to which quality goals and policy are understood within the company/division	x 5 4 3 2 1
Extent to which your company/division integrates quality improvement planning into overall business planning	x 5 4 3 2 1

IV. The following questions relate to the support of human resource development and management function to quality management in your company/division

Extent to which quality-related training is given to hourly employees throughout the company/division	x 5 4 3 2 1
Extent to which training in the basic statistical techniques (such as histograms and control charts) is provided in the company/division as a whole.	x 5 4 3 2 1
Availability of resources for employee training in the company/division	x 5 4 3 2 1
Extent to which employee involvement programs are implemented in the company/division	x 5 4 3 2 1
Effectiveness of employee involvement programs in the company/division	x 5 4 3 2 1
Extent to which hourly/nonsupervisory employees participate in quality decisions	x 5 4 3 2 1
Extent to which employees are held responsible for the output of their process	x 5 4 3 2 1
Extent to which quality awareness building among employees is ongoing	x 5 4 3 2 1
Extent to which the company/division measures employee morale	x 5 4 3 2 1
Extent to which your company/division has an environment conducive to full development of your human resources	x 5 4 3 2 1

V. The following questions relate to quality assurance of products and services in your company/division

Extent to which new product/service design is reviewed before the product/service is produced	x 5 4 3 2 1
Clarity of product/service specifications	x 5 4 3 2 1
Clarity of product/service procedures	x 5 4 3 2 1
Extent to which implementation/productivity is considered in the product/service design process	x 5 4 3 2 1
Extent to which acceptance sampling is used to accept/reject lots or batches of work	x 5 4 3 2 1
Amount of preventive equipment maintenance	x 5 4 3 2 1
Amount of inspection, review, or checking for in-process quality	x 5 4 3 2 1

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Amount of inspection, review, or checking for final quality	x 5 4 3 2 1
Extent to which process design minimizes the chances of employee errors	x 5 4 3 2 1
Clarity of work or process instructions given to employees	x 5 4 3 2 1
Extent to which your company/division uses systematic approaches for assuring quality of goods and services	x 5 4 3 2 1

VI. The following questions relate to supplier quality in your company/division

Extent to which suppliers are selected based on quality rather than price	x 5 4 3 2 1
Degree to which your company relies on few dependable suppliers	x 5 4 3 2 1
Extent to which you educate suppliers	x 5 4 3 2 1
Extent to which your company provides technical assistance to your suppliers	x 5 4 3 2 1
Extent to which the supplier is involved in your product development process	x 5 4 3 2 1
Extent to which the supplier is involved in the improvement of your manufacturing process	x 5 4 3 2 1
Extent to which you build long-term relationships with your suppliers	x 5 4 3 2 1
Clarity of specifications provided to your suppliers	x 5 4 3 2 1
Amount of inspection, review, or checking for incoming quality at your plant	x 5 4 3 2 1
Extent to which your company/division develops relationships with your suppliers that lead to continuous improvements in quality	x 5 4 3 2 1

VII. The following questions relate to quality results of your company/division

Extent to which scrap levels have been reduced by quality management	x 5 4 3 2 1
Extent to which rework levels have been reduced by quality management	x 5 4 3 2 1
Extent to which warranty costs have been reduced by quality management	x 5 4 3 2 1
Extent to which customer complaints have been reduced by quality management	x 5 4 3 2 1
Extent to which the competitive position of your company/division has been enhanced by quality management	x 5 4 3 2 1
Extent to which quality management has contributed to keeping your company/division in business	x 5 4 3 2 1
Extent to which productivity of your company/division has been increased by quality management	x 5 4 3 2 1
Extent to which your company's manufacturing throughput time has been reduced by quality management	x 5 4 3 2 1
Extent to which profits of your company/division have been increased by quality management	x 5 4 3 2 1
Extent to which costs of your company/division have been reduced by quality management	x 5 4 3 2 1
Extent to which quality management has contributed to improve your company's performance both internally and externally	x 5 4 3 2 1

VIII. The following questions relate to customer focus and satisfaction in your quality management practice

Extent to which your company/division is totally committed to create satisfied customers	x 5 4 3 2 1
Extent to which your company's goals exceed customers' expectations	x 5 4 3 2 1
Extent to which executives demonstrate with their actions that customer satisfaction is important	x 5 4 3 2 1
Extent to which employees know which attributes of the products or services your company's customers value most	x 5 4 3 2 1
Extent to which information from customers is used in designing company's products and services	x 5 4 3 2 1
Extent to which your company/division monitors customer complaints	x 5 4 3 2 1
Extent to which your company/division asks customers to give feedback about company's performance	x 5 4 3 2 1
Extent to which the company/division knows how customers perceive quality	x 5 4 3 2 1
Extent to which top management frequently contacts customers	x 5 4 3 2 1
Extent to which the customers' complaints are resolved	x 5 4 3 2 1
Extent to which employees are encouraged to satisfy customers	x 5 4 3 2 1
Extent to which your company/division studies the best practices of other companies to get ideas about how to do things better	x 5 4 3 2 1
Extent to which your company/division compares the current quality levels for products and services features with those of competitors	x 5 4 3 2 1
Extent to which your company/division compares the current quality levels for products and services features with those of world leaders	x 5 4 3 2 1
Extent to which your company/division compares the current process quality levels with those of competitors	x 5 4 3 2 1
Extent to which your company compares the current process quality levels with those of world leaders	x 5 4 3 2 1
Overall, extent to which customer satisfaction is considered in your quality management process	x 5 4 3 2 1

IX. The following questions relate to general matters such as public responsibilities, employee training, well-being, and morale

Extent to which public health issues are considered as a company/division responsibility	x 5 4 3 2 1
Extent to which public safety issues are considered as a company/division responsibility	x 5 4 3 2 1
Extent to which environmental issues are considered as a company/division responsibility	x 5 4 3 2 1
Extent to which the organization extends its quality leadership to the external community	x 5 4 3 2 1
Extent to which training in specific work skills (technical and vocational) is given to hourly employees	x 5 4 3 2 1
Extent to which training in specific work skills (technical and vocational) is given to other employees throughout the company	x 5 4 3 2 1
Extent to which employees are recognized for superior quality performance	x 5 4 3 2 1
Extent to which the company measures employee well-being	x 5 4 3 2 1