

## Research Article

# The Effects of Total Quality Management Practices on Performance and the Reasons of and the Barriers to TQM Practices in Turkey

**Esin Sadikoglu and Hilal Olcay**

*School of Business Administration, Gebze Institute of Technology, 41400 Kocaeli, Turkey*

Correspondence should be addressed to Esin Sadikoglu; [e.sadikoglu@gyte.edu.tr](mailto:e.sadikoglu@gyte.edu.tr)

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Previous studies reported mixed and ambiguous results of the relationship between TQM practices and performances. This study investigated impacts of TQM practices on various performance measures as well as the reasons and the barriers of the TQM practices of firms in Turkey. We used a cross-sectional survey methodology in this study, and the unit of the sample was at the plant level. The sample was selected from the member firms to Turkish Quality Association and the firms located in the Kocaeli-Gebze Organized Industrial Zone. We obtained 242 usable questionnaires, with a satisfactory response rate of 48.4 percent. We conducted exploratory factor analysis and multiple regression analysis. This study has shown that different TQM practices significantly affect different performance outcomes. Results revealed that primary obstacles that the firms in Turkey face were lack of employee involvement, awareness and commitment of the employees, inappropriate firm structure, and lack of the resources. It is recommended that firms should continue implement TQM with all variables to improve performance. Firms should improve employees' involvement/commitment/awareness to TQM, enhance firm structure, and provide resources to overcome the barriers that prevent effective implementation of TQM practices.

## 1. Introduction

Total quality management (TQM) is a firm-wide management philosophy of continuously improving the quality of the products/services/processes by focusing on the customers' needs and expectations to enhance customer satisfaction and firm performance. There are mixed results about the relationship between total quality management practices and performance [1–3]. Table 1 presents a summary of relationships between TQM practices and performance. Although most of the results of the previous studies were positive, some of the results were negative or nonsignificant [2, 3]. The reasons of the mixed results can be as follows. (1) The previous studies used different methods, different TQM variables, and different performance measures in their research models. (2) They were performed in different contexts such as different countries and different industries. (3) The barriers to TQM practices might have caused to the mixed results in different studies.

Research with appropriate analytical methodologies and measuring tools can significantly contribute to investigating work on TQM which analyzed reasons of the relationship between TQM practices and performance. The aims of this work are (1) finding the impact of TQM practices on various firm performances, (2) investigating the reasons and difficulties of implementing TQM practices by firms in Turkey, and (3) using appropriate analytical techniques and statistical analysis methods to investigate the relationship between TQM practices and firm performances. The paper is organized as follows. Section 1 explains the importance and purpose of the research. Section 2 reviews TQM practices and summarizes the results of the relationships between TQM practices and various performance measures reported by the previous studies. Section 2 also includes the proposed research model and the hypotheses related to the relationship between TQM practices and performance measures. Section 3 explains the reasons and the barriers of TQM



TABLE I: Continued.

Hypothesis	Operational performance	Inventory management performance	Employee performance	Innovation performance	Social responsibility	Customer results	Market and financial performance	Aggregate firm performance
	Kannan and Tan, 2005 [50]; Ahire and O'Shaughnessy, 1998 [28]; Phan et al., 2011 [30]; cf. Sadikoglu and Zehir, 2010 [3]	Phan et al., 2011 [30]; Kim et al., 2012 [32]; cf. Sadikoglu and Zehir, 2010 [3]		Phan et al., 2011 [30]; Kim et al., 2012 [32]			Fuentes et al., 2006 [7]	Nair, 2006 [2]; Powell, 1995 [36]; Zehir and Sadikoglu, 2012 [40]
H5: Supplier quality management								
	Samson and Terziovski, 1999 [31]; Terziovski et al., 2003 [53]; Ahire and O'Shaughnessy, 1998 [28]; Dow et al., 1999 [29]; Phan et al., 2011 [30]; Grandzol and Gershon, 1997 [52]; Tari and Claver, 2008 [51]; Das et al., 2000 [12]; cf. Sadikoglu and Zehir, 2010 [3]	Phan et al., 2011 [30]; cf. Sadikoglu and Zehir, 2010 [3]	Samson and Terziovski, 1999 [31]; Dow et al., 1999 [29]; Tari and Claver, 2008 [51]; cf. Sadikoglu and Zehir, 2010 [3]	Phan et al., 2011 [30]; Kim et al., 2012 [32]; Zehir and Sadikoglu, 2012 [40]; cf. Sadikoglu and Zehir, 2010 [3]		Phan et al., 2011 [30]; Forza and Flippini, 1998 [38]; Grandzol and Gershon, 1997 [52]; Tari and Claver, 2008 [51]	Fuentes et al., 2006 [7]; Nair, 2006 [2]; cf. Sadikoglu and Zehir, 2010 [3]	Chong and Rundus, 2004 [60]; Nair, 2006 [2]; Zehir and Sadikoglu, 2012 [40]; Joiner, 2007 [54]
H6: Customer focus								
H7: Strategic quality planning		Phan et al., 2011 [30]; Iltner and Larcker, 1997 [55]			Obeng and Ugboro, 2008 [56]		Macinati, 2008 [35]	

practices. Section 4 gives the research methodology, including population and sample, the survey instrument, data collection procedures, and statistical analysis. Section 5 provides findings obtained from the data analysis, the explanatory factor analysis, tests for reliability and validity of the constructs, and the multiple regression analysis. The final Section, Section 6, presents discussion, managerial implications, future research implications, research limitations, and conclusion.

## 2. The Relationships between TQM Practices and Performance

*2.1. Overall TQM Practices.* Most of the previous studies report that overall TQM practices have positively been related to productivity and manufacturing performance [4, 5], quality performance [6–9], employee satisfaction/performance [3, 7], innovation performance [3, 9, 10], customer satisfaction/results [5, 7, 11, 12], competitive advantage [13, 14], market share [15], financial performance [7, 13, 16–18], and aggregate firm performance [1, 3, 11, 14, 19–23]. However, some authors have found negative or insignificant results [15, 24, 25]. Based on the literature reviewed, we propose the following hypothesis.

H1: TQM practices are positively related to performance.

*2.2. Leadership.* Leaders in a TQM system view the firm as a system; support employee development; establish a multipoint communication among the employees, managers, and customers; and use information efficiently and effectively. In addition, leaders encourage employee participation in decision-making and empower the employees. Top management commitment and participation in TQM practices are the most important factors for the success of TQM practices. Managers should demonstrate more leadership than traditional management behaviors to increase employees' awareness of quality activities in TQM adoption and practices [26, 27].

Previous studies have found that leadership improves operational performance [28–31], inventory management performance [30], employee performance [29, 31], innovation performance [30, 32], social responsibility and customer results [33], financial performance [34], and overall firm performance [35–37]. Based on the literature reviewed, we propose the following hypothesis.

H2: Leadership is positively related to performance.

*2.3. Knowledge and Process Management.* Effective knowledge management ensures that employees obtain timely reliable, consistent, accurate, and necessary data and information as they need to do their job effectively and efficiently in the firm. Only in this way, the expected benefits from TQM practices can be achieved. Process management emphasizes activities, as opposed to results, through a set of methodological and behavioral activities. It includes preventive and proactive approaches to quality management to reduce variations in the process and improve the quality

of the product (cf. [3]). Knowledge and successful process management practices monitor data on quality to manage processes effectively. In this way, turnover rate of purchased materials and inventory can be improved. Errors or mistakes in the processes can also be figured out and corrected on time. The processes are improved by means of controlling the processes periodically and monitoring data on quality continuously. Effective knowledge and process management design minimize the negative effects on the environment. Furthermore, as the processes become prevention oriented, costs are reduced and profit of the firm increases.

Previous studies have found that knowledge, process management, and statistical control/feedback improve operational performance [8, 30, 38], inventory management performance [30], innovation performance [30, 32], social responsibility [33], customer results [30], competitive advantage [16], financial performance [39], and overall firm performance [35, 37, 40]. Thus, we propose the following hypothesis.

H3: Knowledge and process management are positively related to performance.

*2.4. Training.* TQM firms should give necessary training to all their employees to improve their proficiencies in their tasks. Effective training in management and improvement in quality bring success for the firms. Employees' effective knowledge and learning capability will provide sustainability of quality management in the firm. Furthermore, learning organizations adapt rapidly to the changes and develop unique behavior, which distinguishes them from other firms and enables them to obtain better results. Quality does not begin in one department or function; it is the responsibility of the whole firm. Training should be given to all employees based on the results of the training needs assessment [26, 27].

With effective training, employees know the industry and the structure of the firm. In addition, effective training will improve employees' loyalty to the firm, motivation, and work performance. If employees are trained on producing reliable and high quality products and/or services, their full participation in the production stage would be more fruitful. Thus, customer satisfaction will increase and customer complaints will reduce.

Some studies report that training is positively related to operational performance [1, 30], inventory management performance [30], employee performance [7, 41], innovation performance [30, 32], customer results [12, 30], market and financial performance [7], and aggregate firm performance [41, 42], while others report negative/insignificant results [43]. Based on the literature reviewed, we propose the following hypothesis.

H4: Training is positively related to performance.

*2.5. Supplier Quality Management.* Supply chain management in TQM implies reducing and streamlining the supplier base to facilitate managing supplier relationships [44], developing strategic alliances with suppliers [45, 46], working with suppliers to ensure that expectations are met [47], and

involving suppliers early in the product development process to take advantage of their capabilities and expertise [48, 49].

Inputs from suppliers constitute the first phase of producing the products and/or services in a firm. High quality inputs provide high quality products and/or services. Therefore, the suppliers should adopt TQM and be involved in this process. Effective supply management practices enable the suppliers to adopt quality management and deliver reliable and high quality products and/or services timely.

Previous studies have found that supplier quality management positively affects operational performance [28, 30, 50], inventory management performance, innovation performance [30, 32], and overall firm performance [36, 40]. Thus, we propose the following hypothesis.

H5: Supplier quality management is positively related to performance.

**2.6. Customer Focus.** TQM firms focus on serving the external customers. They first should know the customers' expectations and requirements and then should offer the products/services, accordingly. By the aid of successful customer focus efforts, production can be arranged with respect to the customers' needs, expectations, and complaints. This encourages firms to produce high quality and reliable products/services on time with increased efficiency and productivity. When customer expectations are met, their satisfaction will be increased, and the firm's sales and the market share will increase.

Previous studies have found that customer focus positively affects operational performance [28–31, 51–53], inventory management performance [30], employee performance [29, 31, 51], innovation performance [30, 32, 40], customer satisfaction/results [30, 38, 51, 52], sales [51], and aggregate firm performance [40, 54]. Based on the literature reviewed, we suggest the following hypothesis.

H6: Customer focus is positively related to performance.

**2.7. Strategic Quality Planning.** Strategic quality planning includes vision, mission, and values of the firms. They are formed by taking into account the quality concept. With effective strategic quality planning efforts employees are taken as an input in developing the vision, mission, strategies, and objectives. This facilitates acceptance and support of strategic quality plans by the employees. Successful strategic quality planning efforts also take into account the possible side effects of the plan to the environment prior to the production. This will manifest and improve social responsibility of the firm.

Previous studies have found that strategic quality planning is positively associated with operational performance, inventory management performance [30, 55], society results [56], customer results, and market performance [35]. However, strategic quality planning is not statistically related to perceived performance in the computer industry [55]. Thus, we propose the following hypothesis.

H7: Strategic quality planning is positively related to performance.

Figure 1 shows the proposed research model of the relationship between TQM practices and performance measures including hypotheses.

### 3. Reasons of and Barriers to TQM Practices

The reason of implementing TQM practices is improving customer satisfaction, quality of products and/or services, productivity, capacity of the production line, employee performance, quality-of-work-life, market share, and competitive position. Another reason is reducing production development time, waste of inventory, work in process, cost, delivery times, employee turnover, and complaints [3, 11, 27, 40, 57]. Table 2 gives the barriers to TQM practices (cf. [57]).

### 4. Research Methodology

**4.1. Measurement Instrument.** We decided on leadership, knowledge management, training, supplier quality management, customer focus, strategic quality planning, continuous improvement, employee involvement, and process management as the factors of TQM practices based on the literature review. We also included multiple performance factors, namely, operational performance, inventory management performance, employee performance, innovation performance, social responsibility, customer results, and market and financial performance, to cover all aspects of firm performance. Furthermore, the TQM index, which was developed by Sadikoglu and Zehir [3], was used as a composite variable of TQM practices. We adopted the items of the questionnaires of Ahire and Ravichandran [58], Boullusar et al. [59], Chong and Rundus [60], Claver et al. [61], Conca et al. [62], Cua et al. [63], Das et al. [12], Kaynak [1], Prajogo and Sohal [24], Rahman and Bullock [64], Rungtusanatham et al. [43], Samson and Terziovski [31], Sila [65], Tari et al. [42], and Zu et al. [37] for both the TQM and performance measurements. The items of the questionnaires of Anderson et al. [66], De Cerio [67], Flynn et al. [68], Fuentes-Fuentes et al. [69], Saraph et al. [70], and Taveira et al. [71] were adopted for the TQM items, and the items of the questionnaires of Benson et al. [72], Kannan and Tan [50], and Terziovski et al. [53] were used for the performance measurement items. We inserted repeating items in each page of the questionnaire to figure out respondent bias and carefulness. The initial questionnaire included 51 TQM items and 29 performance items, respectively. Thirty-one items for the TQM practices and 27 items for the performance measures remained after exploratory factor analysis (EFA) and reliability analysis (appendix). The items included a five-point Likert-type scale anchored from (1) strongly disagree to (5) strongly agree, which indicates respondents' disagreement or agreement with each item, respectively. Only the items of the reasons of and the barriers to TQM practices and the reasons of being ISO certified were open-ended questions.

**4.2. Population and Sample.** We used a cross-sectional survey methodology in this study, and the unit of the sample was at the plant level. The sample was selected from

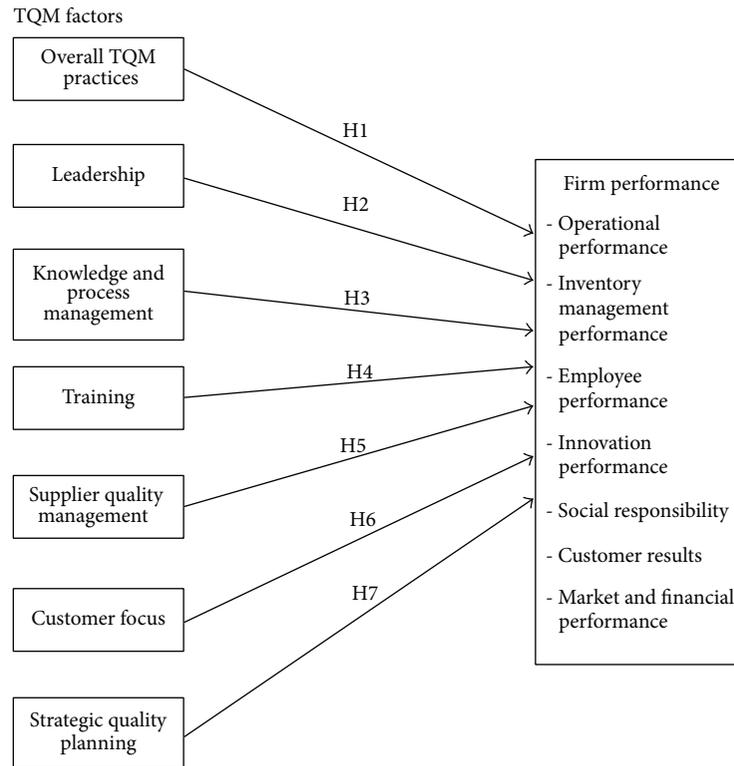


FIGURE 1: The proposed research model of the relationship between TQM practices and performance measures.

the member firms of Turkish Quality Association and the firms located in the Kocaeli-Gebze Organized Industrial Zone. The members of the Quality Association were more likely to excel in TQM practices and to have ISO certification. We sent questionnaires to 500 firms in 2010.

**4.3. Data Collection Process.** We refined the questionnaire based on the comments taken from the company representatives (respondents), managers, and academicians. We also revised the questionnaire after conducting a pilot study and taking feedback from the respondents to make it simple, clear, understandable, and easy-to-follow. We asked the respondents about their firm's performance data based on the last three years' period with respect to their major competitor in the industry. We promised confidentiality, and we did not ask for the names of the respondents to improve accuracy of responses and response rate. Furthermore, we agreed on sending the final firm profile to the firms that participated in the survey, on request, to obtain a high response rate. We administered the questionnaires with the guidelines of the follow-up stages given by Saunders et al. [73] in order to increase response rate. Specifically, we administered the survey as follows. First, we informed recipients about the survey and questionnaire by email, telephone, or face-to-face conversation. Second, we sent the survey with a cover letter on Monday morning, when the recipients were likely to be receptive. Finally, we sent the questionnaire to all recipients one week later to increase the response rate. We thanked the early respondents and reminded nonrespondents. We

could not post a second follow-up because we did not know which firm responded to the survey. We sent two questionnaires to each firm, and we used the average of them to reduce common method bias. We obtained the responses via email, fax, or face-to-face meeting. We obtained 242 usable questionnaires, with a satisfactory response rate of 48.4 percent.

**4.4. Statistical Analysis.** We conducted EFA to establish factorial validity and to confirm whether or not the theorized dimensions emerge. EFA analysis showed that the factors were logic and reflected accurately what was intended to be measured. We used principle components extraction with varimax rotation to identify factors with eigenvalues of at least one in order to obtain more easily interpreted factor loadings. We performed a bivariate correlation analysis to identify the correlation of TQM factors with each other and with the measures of firm performances. We used multiple regression analysis for each performance measure to figure out the relationship between TQM practices and performance. The TQM index equals the aggregate of all TQM factors [3]. We classified the reasons of and the barriers to TQM practices of firms in Turkey according to frequency distribution of the sample.

## 5. Results

**5.1. Sample Demographics.** Table 3 presents the demographics of the sample. As clearly noticed in the table, most of

TABLE 2: Barriers to TQM practices.

The main barriers to TQM practices	References
Failure to incorporate quality management to all departments	Harris, 1995 [83]; Smith et al., 1994 [84]
Resistance of the workforce; inadequate use of empowerment and teamwork; failure to develop employee participation	Harris, 1995 [83]; Whalen and Rahim, 1994 [85]; Masters, 1996 [78]; Goetsch and Davis, 2010 [27]; Bohan, 1998 [86]
Lack of proper training and preparation	Whalen and Rahim, 1994 [85]; Masters, 1996 [78]; Bohan, 1998 [86]; Burril and Ledolter, 1999 [87]
Inappropriate supervisory structure or culture of the firm for implementing TQM	Whalen et al., 1994 [85]; Masters, 1996 [78]; McCabe et al., 1998; Burril and Ledolter, 1999 [87]
Lack of involvement and commitment of top management	Baillie 1986 [88]; Smith et al., 1994 [84]; Whalen and Rahim, 1994 [85]; Masters, 1996 [78]; Bohan, 1998 [86]; Goetsch and Davis, 2010 [27]
Lack of understanding of TQM; inappropriately adopting TQM to the organization	Smith et al., 1994 [84]; Masters, 1996 [78]; Bohan, 1998 [86]; Goetsch and Davis, 2010 [27]
Managers' resistance to learn and change	Smith et al., 1994 [84]; Goetsch and Davis, 2010 [27]
Inability to build a learning organization that provides for continuous improvement	Masters, 1996 [78]
Poor planning	Whalen and Rahim, 1994 [85]; Masters, 1996 [78]
Insufficient resources provided	Whalen and Rahim, 1994 [85]; Masters, 1996 [78]
Ineffective measurement of quality improvement and lack of access to data and results	Whalen and Rahim, 1994 [85]; Masters, 1996 [78]
Inappropriate reward system	Masters, 1996 [78]; Goetsch and Davis, 2010 [27]
Short-term focus or using a Band-Aid solution	Masters, 1996 [78]; Goetsch and Davis, 2010 [27]
Paying inadequate attention to internal and external customers	Masters, 1996 [78]; Goetsch and Davis, 2010 [27]
Downsizing	McCabe and Wilkinson, 1998 [89]

the 242 firms (91.2%) were private firms; 75.5 percent of the firms were international or global firms; 74.7 percent of the firms were manufacturing firms; 53.0 percent of the firms were large firms, who had more than 250 employees. Most of the respondents were quality managers (44.0%) and middle level managers (53.9%). Most of the firms (92.2%) were ISO certified, 64 percent of the firms had a quality award, and 84 percent of the firms did not get a firm award.

TABLE 3: Demographic profiles of the respondents.

Sector	
Private	217 (91.2%)*
Public	21 (8.8%)
Scope of operation	
Regional	23 (9.7%)
National	35 (14.8%)
International	101 (42.8%)
Global	77 (32.7%)
Industry	
Manufacturing (74.7%)	
Electronics and metallurgy	59 (24.9%)
Automotive	45 (19.0%)
Construction	29 (12.2%)
Chemistry	18 (7.6%)
Textile	16 (6.8)
Plastics	6 (2.5%)
Food	4 (1.7%)
Service (25.3%)	
Logistics	16 (6.8%)
Municipality	9 (3.8%)
Education	8 (3.4%)
Healthcare	8 (3.4%)
Telecommunication	8 (3.4%)
Research and development	5 (2.1%)
Environment	3 (1.3%)
Tourism	2 (0.8%)
Finance	1 (0.4%)
Number of employees	
Small (less than 100)	56 (25.3%)
Medium (between 100 and 250)	48 (21.7%)
Large (more than 250)	117 (53.0%)
Job title	
Senior manager (top manager, vice manager)	27 (11.6%)
Middle manager	125 (53.9%)
Quality manager	102 (44.0%)
Sales and marketing manager	4 (1.7%)
Production manager	3 (1.3%)
Human resources manager	3 (1.3%)
Finance and accounting manager	1 (0.4%)
Other manager	12 (5.2%)
Low-level manager	63 (27.2%)
Nonmanager (engineer or technician)	17 (7.3%)
Existence of ISO certification	
Yes	202 (92.2%)
No	17 (7.8%)
Existence of quality awards	
Yes	144 (64.0%)
No	81 (36.0%)
Existence of firm awards	
Yes	35 (16.0%)
No	184 (84.0%)

\*The numbers in the parentheses give percentages of the corresponding values.

TABLE 4: Rotated factor matrix of the TQM practices.

Variables	Factor loadings							Eigen value	Percentage variance explained by factor	Percentage total variance explained
	Item number 1	Item number 2	Item number 3	Item number 4	Item number 5	Item number 6	Item number 7			
Leadership	0.75	0.56	0.58	—	—	—	—	2.09	6.74	6.74
Knowledge and process management	0.56	0.58	0.62	0.53	0.68	0.66	0.59	4.10	13.22	19.96
Training	0.57	0.80	0.68	0.60	0.55	—	—	3.01	9.72	29.68
Supplier quality management	0.56	0.65	0.67	0.75	0.72	—	—	3.49	11.27	40.95
Customer focus	0.82	0.79	0.61	0.56	0.60	0.52	—	3.81	12.29	53.24
Strategic quality planning	0.66	0.56	0.67	0.79	0.71	—	—	3.69	11.90	65.14

TABLE 5: Rotated factor matrix of the firm performances.

Variables	Factor loadings					Eigen value	Percentage variance explained by factor	Percentage total variance explained
	Item number 1	Item number 2	Item number 3	Item number 4	Item number 5			
Operational performance	0.83	0.83	0.63	—	—	2.55	9.46	9.46
Inventory management performance	0.85	0.88	—	—	—	2.01	7.42	16.88
Employee performance	0.76	0.71	0.76	0.78	0.70	3.46	12.80	29.68
Innovation performance	0.68	0.77	0.80	0.77	0.78	3.54	13.12	42.80
Social responsibility	0.82	0.82	0.81	0.73	0.74	3.73	13.83	56.63
Customer results	0.66	0.72	0.54	—	—	1.86	6.89	63.52
Market and financial performance	0.75	0.81	0.85	0.84	—	3.27	12.11	75.63

5.2. Results of the EFA, Reliability, Descriptive Statistics, and Correlations. We performed EFA for TQM practices and performance measures separately. After EFA and reliability analysis, the final measurement instrument included 31 TQM items and 27 performance measurement items. As clearly noticed from Tables 4 and 5, the TQM items explained 65.14 percent of the total variance, and performance measurement items explained 75.63 percent of the total variance, with the eigenvalue of more than one, respectively. Specifically, leadership included three items that explained 6.74 percent of the total variance, knowledge and process management included seven items that explained 13.22 percent of the total variance, training included five items that explained 9.72 percent of the total variance, supplier quality management included five items that explained 11.27 percent of the total variance, customer focus included six items that explained 12.29 percent of the total variance, and strategic quality planning included five items that explained 11.90 percent of the total variance. The items of continuous improvement and employee involvement were eliminated after EFA. Also, the items of knowledge management and items of process

management fell into one variable named as knowledge and process management. Table 5 shows that operational performance had three items that explained 9.46 percent of the total variance, inventory management performance had two items that explained 7.42 percent of the total variance, employee performance had five items that explained 12.80 percent of the total variance, innovation performance had five items that explained 13.12 percent of the total variance, social responsibility had five items that explained 13.83 percent of the total variance, customer results had three items that explained 6.89 percent of the total variance, and market and financial performance had four items that explained 12.11 percent of the total variance. The final items of the questionnaire were given in the appendix. The factors had content validity since their items were adapted from the previous studies in the literature.

Table 6 lists descriptive statistics, Cronbach’s alpha values, and Pearson correlations for the variables in the research model. All factor loadings were greater than 0.50 thresholds. This means that unidimensionality and construct validity of the measures were satisfied. Cronbach’s alpha values of the

TABLE 6: Descriptive statistics, Cronbach’s alpha, and bivariate correlation for the variables in the research model\*.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean	S.D.
1 Leadership	0.77	—	—	—	—	—	—	—	—	—	—	—	—	—	4.18	0.72
2 Knowledge and process management	0.64	0.87	—	—	—	—	—	—	—	—	—	—	—	—	4.05	0.68
3 Training	0.55	0.65	0.81	—	—	—	—	—	—	—	—	—	—	—	4.07	0.63
4 Supplier quality management	0.56	0.63	0.56	0.84	—	—	—	—	—	—	—	—	—	—	3.46	0.82
5 Customer focus	0.53	0.62	0.57	0.59	0.86	—	—	—	—	—	—	—	—	—	4.42	0.58
6 Strategic quality planning	0.63	0.66	0.60	0.58	0.66	0.90	—	—	—	—	—	—	—	—	4.21	0.70
7 Operational performance	0.41	0.43	0.46	0.39	0.48	0.42	0.86	—	—	—	—	—	—	—	4.49	0.53
8 Inventory management performance	0.23	0.50	0.37	0.40	0.30	0.28	0.37	0.90	—	—	—	—	—	—	4.01	0.83
9 Employee performance	0.50	0.45	0.55	0.45	0.42	0.56	0.49	0.36	0.87	—	—	—	—	—	4.02	0.71
10 Innovation performance	0.28	0.43	0.33	0.35	0.36	0.31	0.49	0.41	0.45	0.88	—	—	—	—	4.09	0.74
11 Social Responsibility	0.51	0.60	0.50	0.58	0.50	0.60	0.42	0.36	0.51	0.47	0.90	—	—	—	4.27	0.73
12 Customer results	0.40	0.46	0.47	0.41	0.50	0.46	0.66	0.40	0.60	0.51	0.45	0.81	—	—	4.40	0.59
13 Market and financial performance	0.35	0.51	0.37	0.34	0.51	0.33	0.41	0.43	0.34	0.43	0.44	0.47	0.90	—	4.16	0.72
14 TQM index	0.80	0.86	0.80	0.82	0.79	0.84	0.52	0.43	0.60	0.42	0.67	0.55	0.49	0.90	4.07	0.56

\*N = 242; all correlations are significant at the P < 0.01 level (2-tailed). Values on the diagonal are Cronbach’s alpha.

factors were between 0.77 and 0.90, which surpasses the 0.70 threshold. This showed that all TQM and performance scales had acceptable reliabilities.

As presented in Table 6, the mean values of TQM practices were greater than four. This means that the firms that participated in the survey, in general, have implemented TQM highly with the Lai et al. [74] definition. The study has found that all factors are positively correlated with each other at the significance level of P < 0.01. The measures have face validity because we refined the questionnaire with respect to feedback from the managers and academicians and the results of the pilot study. The bivariate correlations among the TQM factors range from 0.53 to 0.66. The correlations between the TQM practices and performance measures range from 0.23 to 0.60. The correlations among the performance measures range from 0.34 to 0.66. The measures have discriminant validity since the correlation coefficients between the TQM practices and performance measures are lower than the reliability coefficients. There is a strong criterion-related validity since the bivariate correlations of the TQM practices with performance measures are statistically significant.

Correlation coefficients values of independent variables are less than 0.8 (Table 6). This suggests that results will be close to true value, and their multicollinearity does not have an undue effect on the regression models [75].

5.3. Results of the Regression Analyses between TQM Practices and Performance. Table 7 shows the results of the regression analysis between TQM index and the various performance

measures. All regression models are significant (P < 0.01) and TQM index is significantly and positively related to performance. This shows that TQM practices, in general, improve firm performance.

Tables 7–14 present the results of the regression analysis between the TQM practices and operational performance, inventory management performance, employee performance, innovation performance, social responsibility, customer results, and market and financial performance, respectively. In all regression tables, the regression models are statistically significant (P < 0.001). The coefficient of multiple determination, R<sup>2</sup>, shows the proportion of variation of the dependent variable accounted for by the independent variables in the regression model. R<sup>2</sup> values of all regression models are greater than either 0.15 or 0.35 that can be interpreted as medium effect or strong effect, respectively [76].

5.4. Results of the Reasons of TQM Practices and ISO Adoption and the Barriers to TQM Practices. Table 15 shows the frequency distribution of the reasons of TQM practices of the firms. Table 16 reveals the frequency distribution of the barriers of TQM practices faced by the firms.

## 6. Discussion, Research Implications, and Conclusion

6.1. Discussion of the Analyses. The study has found that TQM index is positively related to all performance measures.

TABLE 7: The results of the regression analysis between TQM index and performance measures.

Dependent variable: performance	Independent variable: TQM index					
	$\beta$	$T$	$P$	Result	$R^2_{adj}$	$F$
Regression 1						
Operational performance	0.52	9.45	0.00	Significant	0.27	89.37
Regression 2						
Inventory management performance	0.41	6.88	0.00	Significant	0.17	47.37
Regression 3						
Employee performance	0.60	11.51	0.00	Significant	0.35	132.47
Regression 4						
Innovation performance	0.42	7.03	0.00	Significant	0.17	49.39
Regression 5						
Social responsibility	0.67	13.81	0.00	Significant	0.44	190.84
Regression 6						
Customer results	0.55	10.11	0.00	Significant	0.30	102.28
Regression 7						
Market and financial performance	0.48	8.28	0.00	Significant	0.22	68.53

All regressions are significant at the  $P < 0.01$  level (2-tailed).

TABLE 8: The result of the regression analysis between TQM practices and operational performance.

Independent variables	Dependent variable: operational performance			
	$\beta$	$T$	$P$	Result
Leadership	0.11	1.40	0.16	Insignificant
Knowledge and process management	0.03	0.39	0.70	Insignificant
Training	0.21	2.73	0.01	<b>Significant</b>
Supplier quality management	0.02	0.32	0.75	Insignificant
Customer focus	0.26	3.21	0.00	<b>Significant</b>
Strategic quality planning	0.01	0.16	0.88	Insignificant

$R^2_{adj} = 0.28$ ;  $F = 16.39$ ;  $P < 0.001$ .

TABLE 9: The result of the regression analysis between TQM practices and inventory management performance.

Independent variables	Dependent variable: inventory management performance			
	$\beta$	$T$	$P$	Result
Leadership	-0.19	-2.40	0.02	Insignificant
Knowledge and process management	0.51	5.63	0.00	<b>Significant</b>
Training	0.10	1.21	0.23	Insignificant
Supplier quality management	0.18	2.35	0.02	Insignificant
Customer focus	-0.01	-0.14	0.89	Insignificant
Strategic quality planning	-0.10	-1.18	0.24	Insignificant

$R^2_{adj} = 0.26$ ;  $F = 15.10$ ;  $P < 0.001$ .

TABLE 10: The result of the regression analysis between TQM practices and employee performance.

Independent variables	Dependent variable: employee performance			
	$\beta$	$T$	$P$	Result
Leadership	0.17	2.31	0.02	Insignificant
Knowledge and process management	-0.09	-1.15	0.25	Insignificant
Training	0.30	4.22	0.00	<b>Significant</b>
Supplier quality management	0.08	1.18	0.24	Insignificant
Customer focus	-0.36	-0.49	0.62	Insignificant
Strategic quality planning	0.31	3.93	0.00	<b>Significant</b>

$R^2_{adj} = 0.39$ ;  $F = 26.48$ ;  $P < 0.001$ .

TABLE 11: The result of the regression analysis between TQM practices and innovation performance.

Independent variables	Dependent variable: innovation performance			
	$\beta$	$T$	$P$	Result
Leadership	-0.04	-0.50	0.62	Insignificant
Knowledge and process management	0.30	3.18	0.00	<b>Significant</b>
Training	0.04	0.47	0.64	Insignificant
Supplier quality management	0.10	1.25	0.21	Insignificant
Customer focus	0.13	1.59	0.11	Insignificant
Strategic quality planning	-0.04	-0.38	0.70	Insignificant

$R^2_{adj} = 0.18$ ;  $F = 9.84$ ;  $P < 0.001$ .

TABLE 12: The result of the regression analysis between TQM practices and social responsibility.

Independent variables	Dependent variable: social responsibility			
	$\beta$	$T$	$P$	Result
Leadership	0.04	0.53	0.60	Insignificant
Knowledge and process management	0.20	2.64	0.01	<b>Significant</b>
Training	0.04	0.53	0.60	Insignificant
Supplier quality management	0.25	3.64	0.00	<b>Significant</b>
Customer focus	0.01	0.07	0.94	Insignificant
Strategic quality planning	0.28	3.69	0.00	<b>Significant</b>

$R^2_{adj} = 0.45; F = 34.16; P < 0.001.$

TABLE 13: The result of the regression analysis between TQM practices and customer results.

Independent variables	Dependent variable: customer results			
	$\beta$	$T$	$P$	Result
Leadership	0.05	0.61	0.54	Insignificant
Knowledge and process management	0.07	0.80	0.42	Insignificant
Training	0.18	2.30	0.02	<b>Significant</b>
Supplier quality management	0.04	0.53	0.60	Insignificant
Customer focus	0.25	3.20	0.00	<b>Significant</b>
Strategic quality planning	0.09	1.07	0.28	Insignificant

$R^2_{adj} = 0.30; F = 18.20; P < 0.001.$

TABLE 14: The result of the regression analysis between TQM practices and market and financial performance.

Independent variables	Dependent variable: market and financial performance			
	$\beta$	$T$	$P$	Result
Leadership	0.02	0.26	0.80	Insignificant
Knowledge and process management	0.38	4.40	0.00	<b>Significant</b>
Training	0.02	0.25	0.80	Insignificant
Supplier quality management	-0.06	-0.80	0.42	Insignificant
Customer focus	0.40	5.13	0.00	<b>Significant</b>
Strategic quality planning	-0.17	-2.06	0.04	Insignificant

$R^2_{adj} = 0.31; F = 19.13; P < 0.001.$

TQM practices, in general, improve performance of the firm. Moreover, the study has found that different TQM practices significantly affect different outcomes. Although leadership is not significantly related to any performance measures, knowledge and process management practices are positively

TABLE 15: Frequency distribution of the reasons of TQM practices of firms.

The reasons of TQM practices	Frequency	Percentage (%)
Improving operational performance	160	34.2
Improving customer satisfaction and portfolio	103	22.0
Increasing market and financial performance	95	20.3
Supporting continuous improvement and innovations	54	11.5
Enhancing employees' performance and participation	49	10.5
Improving social responsibilities of the firm	7	1.5

TABLE 16: Frequency distribution of the barriers of the TQM practices.

	Frequency	Percentage (%)
Lack of employee involvement	82	24.7
Inadequacy of the firm structure and lack of the resources	61	18.4
Illiteracy and unawareness among the employees	51	15.4
Constraints of the industry/market	38	11.5
Inaccuracy and assessment difficulty in the process planning	33	9.9
Inadequacy in the leadership comprehension	27	8.1
Lack of understanding the importance of continuous improvement	13	3.9
Discrepancies among customers' expectations	10	3.0
Difficulty in the TQM structure	10	3.0
Lack of the suppliers' support	7	2.1

related to inventory management performance, innovation performance, social responsibility, and market and financial performance.

Knowledge and process management practice is the only TQM factor that directly and positively affects inventory management performance and innovation performance (Tables 9 and 11). When a firm has an effective performance measurement system, it monitors data on quality and the processes successfully, and it gets its current performance data as needed, to appropriately manage its inventory. Thus, turnover rate of purchased materials and inventory can be improved. Errors/mistakes in the processes can be figured out and corrected; processes are improved and innovativeness of the firm is achieved via controlling the processes periodically and monitoring the quality data continuously. With effective knowledge and process management practices, the firm can also introduce innovative products/services frequently and it can increase its sales and profitability. By successful monitoring of the data on quality, special cause variation in the process can be removed, and the special cause variation can be

differentiated from the common cause variation. Therefore, new product or service installment or process development can be made on time. This can trigger new product/service or process development. Knowledge about the environmental impacts of the products/services or processes can be used in monitoring and improving design of the products/services or processes such as eliminating or reducing the harmful parts/components in the products or services with respect to the environment or health of the society. Designing robust processes improves total profitability of the firm.

It has been found that training is positively related to operational performance, employee performance, and customer results. Allocating firm resources to training on quality pays off as professional employees know advanced statistical techniques, concepts of quality, basic characteristics of their industry, and the structure and processes of the firm. Furthermore, treating employees as a valuable resource increases their loyalty to the firm, motivates them and makes them proud of their jobs, improves their work-related performances, decreases absenteeism, and reduces intentions to quit. Educated employees will increase quality, reliability, and timely delivery of the products/services. With effective training, employees know the industry and the structure of the firm better. Effective training on quality also increases employees' skills to work effectively and efficiently. Furthermore, it will improve employees' loyalty to the firm, their motivation, and work-related performances. Employees' training on delivering high quality and reliable products and/or services reduces customer complaints.

It has been found that supplier quality management is positively related to social responsibility. A firm cannot contribute to the society effectively without the collaboration among the supply chain partners. All partners in the supply chain should comprehend the effect of their products/services on the health of the society and environment. When suppliers have quality management systems, they are evaluated with respect to quality and delivery performance and participate in quality training, process improvement, and the new product development process. The synergy among the whole supply chain will make a sense of responsibility of the society so that each partner tries to do their best to protect the environment and reduce noise and pollution. This allows the firm to carry out social responsibility projects for the society with more effective and efficient manner.

Customer focus is the only TQM variable that significantly directly increases customer results (Table 13). It has been found that customer focus is positively related to operational performance, customer results, and market and financial performance. If a firm knows the needs and expectations of the customers accurately and on time via frequent communication with and feedback from the customers, the firm can produce high quality, reliable, and timely delivered products or services. Systematic measurement of customer feedback and its use in the product/service or process improvement can increase customer satisfaction. When a firm knows the customers' current and future needs, expectations, and complaints accurately and on time, the firm can invest in profitable areas and improve its sales, market share, and total profitability.

It has been found that strategic quality planning is positively related to employee performance and social responsibility. If the employees' opinions are taken into consideration in developing the mission, strategy, and objectives of the firm, the employees will support them. Thus, the employees feel like they belong to the firm and work hard with a high degree of motivation to achieve companies' objectives. As a result, their absenteeism and intention to leave the firm will be low. Society is concerned about the conservation of the environment, and it gives credit to the firms which contribute to environmental protection. If a firm develops its strategies on quality and organizational objectives by considering its possible side effects to the environment and living standards of the society, the firm can reduce or eliminate pollution and noise, protect the environment, and gain a positive image in the society.

The results suggest that firms implement TQM for the purpose of improving operational performance, enhancing customer satisfaction and portfolio, and increasing market and financial performance which are the primary reasons of TQM practices (Table 15). Results also have shown that the reasons of acquiring the ISO certification(s) or the quality/supplier award(s) of the firms are the same as the reasons of the TQM practices. Therefore, acquiring the ISO certifications contributes to successful TQM practices. ISO certification for the purpose of advertisement and marketing gimmick prevents the firms from implementing the TQM practices resulting in insignificant or negative effects on performance of the firm [77]. In addition, certified TQM firms can get more recognition and credibility in the market than non-ISO-certified TQM firms.

As given in Table 16, the firms in Turkey face some obstacles such as employee involvement (24.7%), inadequacy of the firm structure and lack of the firm resources (18.4%), illiteracy and unawareness among the employees (15.4%), and constraints of the industry/market (11.5%). Most of the obstacles are employee-related barriers. Firms should primarily focus on change management, employee involvement, and skill development.

## 6.2. Research Implications

**6.2.1. Managerial Implications.** The positive relationship between TQM and performance measures shows the importance of each of these practices to improve sustainability. The reasons of TQM implantations and ISO certification may guide managers on how to motivate employees in these applications in order to improve firm performance. Discovering the barriers to TQM can be used for the firms who are in the planning or early stages of TQM practices to improve awareness and understanding of its principles. They can also be used for the firms who have already used TQM for some time to assess the progress and to improve their organizations [78].

**6.2.2. Future Research Implications.** Continuous improvement and employee involvement are the major tenets of TQM practices. These factors can be included in future

studies. Insignificant relationship between leadership and performance can indicate existence of indirect relationship or any other relationship that is nonlinear. Insignificant relationship between some TQM variables and performance may imply mediational relationship among TQM practices. There may also be some mediational relationships among various performance measures. Mediational or indirect relationships among TQM practices and multiple performance measures can be investigated. The relationship between TQM practices and the various performance measures can be investigated in other countries and industries. Enterprise resource planning, ISO certification, firm age, and firm size can also be included as moderating variables in future studies. The reasons of and the barriers to TQM practices and the reasons of having ISO certification may be different in other countries and industries so that a comparative study can be conducted to investigate these parameters.

**6.2.3. Research Limitations.** The study used subjective measures of performance which may not give accurate information to test the hypotheses. However, we compared the firms in different industries by using subjective measurements. Furthermore, the study asked for perceived data about actual TQM practices and performance measures, but the respondents might have given desired data, which made their firms look good. About 7 percent of the respondents were nonmanagers, who might not understand and answer the questions accurately. In addition, the firms were the members of Quality Association and/or located in the Marmara Region. This would raise concerns about generalizability, reliability, and validity of the study. On the other hand, we did not ask for the names of the firms and respondents which caused which firms belong to which sector. Anonymity of the firm and respondent in the survey may improve accuracy and completeness of the responses. We used average of two responses for each firm to reduce common method variance. Also, none of the repeating items in the questionnaire of the responses were different than  $\pm 1$ . Because the model exceeded the required threshold values, common method bias would be expected not to cause a serious problem in data evaluation.

**6.3. Conclusion.** TQM is a holistic and ethical approach of the firms to continuously improve their products/services or processes involving all stakeholders in order to satisfy their customers and to improve performance and sustainability. The results give that overall TQM practices improve all performance measures. Leadership does not affect performance. This is supported by the results of Choi and Eboch [11] and Kannan and Tan [50]. Knowledge and process management practices improve inventory management performance, innovation performance, social responsibility, and market and financial performance. Successful training improves operational performance, employee performance, and customer results. It has been found that successful supplier quality management enhances social responsibility. Effective customer focus efforts increase operational performance, customer results, and market and financial performance.

Effective strategic quality planning efforts improve employee performance and social responsibility of the firm.

It can be concluded that TQM practices improve various performance measures in the firms. All aspects of TQM practices should be effectively managed in a firm because each factor in TQM practices improves different aspects of firm performance. The synergy among the TQM factors brings about exceptional or crucial improvements in the firm performances. Firms should improve employee involvement/skill and firm structure and allocate sufficient resources to implement TQM successfully.

## Appendix

### A. Measurement Scales, Survey Items, and Their Sources

Only the items that remained after the reliability tests and EFA are given in the appendix. The sources of each item in the questionnaire are given in the parenthesis at the end of the related item.

#### A.1. Total Quality Management

**A.1.1. Leadership.** Organizational top management (senior executives and supervisors) views improvement in quality as a way to increase profits [65, 70].

Organizational top management has objectives for quality performance [37, 58, 70].

Organizational top management is evaluated for quality performance [37, 58, 63, 65, 68, 70].

**A.1.2. Knowledge Management.** Our firm has an effective performance measurement system to track overall organizational performance [24, 37].

Quality data (error rates, defect rates, scrap, defects, rework rates, cost of quality, etc.) are available [37, 58, 65, 70].

Timely firm performance data are always available [37, 43, 59, 63, 65, 68, 71].

**A.1.3. Process Management.** We design processes in our firm to be “mistake-proof” to minimize the changes of errors [24, 37, 42, 61, 62, 65, 67, 68, 70].

We make extensive use of statistical techniques to reduce variation in processes [24, 37, 43, 63, 65, 66, 68].

We give clear, comprehensive, and standardized documentation about work methods and process instructions to employees [24, 31, 37, 43, 59, 65, 67].

A large amount of the equipment on the shop floor is currently under statistical process control [37, 43, 63, 67, 68].

**A.1.4. Training.** Training in advanced statistical techniques is given to the employees who need training [12, 70].

Our employees possess sufficient knowledge of the basic aspects of our sector [42, 62, 69].

Our employees understand the basic processes used to make our products/services [42, 62, 69].

Managers and supervisors participate in specialist training [12, 42, 61, 62, 70].

Resources are available for employee quality training in our firm [58].

*A.1.5. Supplier Quality Management.* Our suppliers have an effective system to ensure quality of their products and/or services [64, 65].

We emphasize quality and delivery performance rather than price in selecting suppliers [42, 58, 61–63, 65, 68, 70].

Our suppliers are involved in our quality training [37].

We work closely with suppliers to improve each other's processes [24, 31, 42, 61, 62, 64, 65, 71].

Our suppliers are actively involved in our new product development process [64, 68].

*A.1.6. Customer Focus.* We frequently are in close contact with our customers [24, 68].

We actively and regularly seek customer inputs to identify their needs and expectations [12, 24, 31, 60, 68].

We inform customers' current and future needs and expectations to our employees effectively [24, 31, 37, 65].

Our customers give us feedback on quality and delivery performance [37, 68].

Customer complaints are used as input to improve our processes [12, 31, 65].

We measure customer satisfaction systematically and regularly [24, 64].

*A.1.7. Strategic Quality Planning.* We have a mission statement which has been communicated throughout the firm and is supported by our employees [24, 31].

We develop and implement our strategies and plans based on data concerning customers' requirements and the firm's capabilities [42, 62].

The management communicates its strategy and objectives to the staff [42, 61, 62].

Customers' needs are taken into account when establishing objectives [59].

Our quality strategies affect all organizational areas and managerial activities [59].

## A.2. Performance

*A.2.1. Operational Performance.* Quality of our products/services is high [50, 60, 63, 65].

Reliability of our products/services is high [24, 58, 79].

We deliver our products/services on time to customers [31, 63–65, 79].

*A.2.2. Inventory Management Performance.* Purchase material turnover is high in our firm [1, 80].

Total inventory turnover is high in our firm [1, 80].

*A.2.3. Employee Performance.* Our employees' organizational commitment is high [59].

Our employees' job performance is high [65].

Our employees' absenteeism is low [59, 65].

Our employees' morale is high [31, 60, 64].

Our employees' turnover rate is low [59, 65].

*A.2.4. Innovation Performance.* The number of successful new product/service introductions of our firm is high [24, 60, 65].

The use of latest technological innovations in our new product is high [24].

The technological competitiveness of our firm is high [24].

The speed of new product development of our firm is high [24].

The number of our new products that are first-to-market is high [24].

*A.2.5. Social Responsibility.* Protection of environment in our firm has developed [42, 59, 61].

Noise levels caused by our firm have decreased [59].

Pollution levels caused by our firm have decreased [59].

Our firm has a positive impact on society [59].

Our firm is actively involved in the community [42, 61].

*A.2.6. Customer Results.* Customer satisfaction has improved [12, 31, 37, 42, 43, 59, 61, 62, 64, 72].

Customer retention has improved [12, 65].

Customer complaints have decreased [59].

*A.2.7. Market and Financial Performance.* Return on assets of our firm has increased [1, 12, 37, 50, 65, 80].

Market share of our firm has improved [1, 12, 37, 59, 65, 80].

Profits of our firm have grown [1, 37, 42, 59, 61, 62, 65, 80].

Sales of our firm have grown [1, 37, 59, 80].

## Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

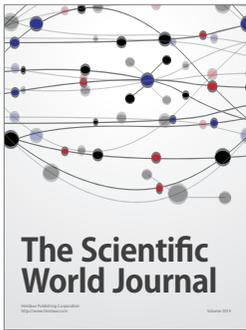
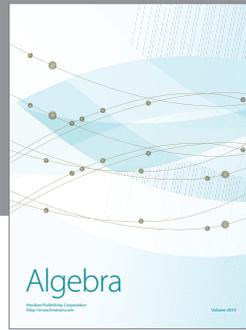
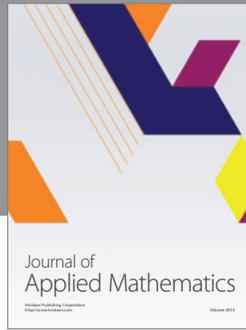
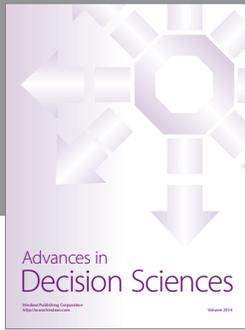
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