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# The Importance of Quality Management Implementation in Public Sector and Role of Behavioral Quality Management Practice*

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## ABSTRACT

Quality management has been regarded as a valuable strategy or activity for the public sector. The purpose of this paper is to examine the relationship between implementation of quality management practices and performance in the public sector. Moreover, it investigates what effect the practices have on performance in the public sector by dividing relevant practices into two types of quality management practices based on the previous literature review. By analyzing data on 130 samples of State-Owned Enterprises and 370 samples of para-government agencies, this study reveals that implementing quality management has a positive effect on both financial performance and the customer satisfaction index. In addition, behavioral quality management practices have an indirect effect on the relationship between technical quality management and performance.

**Keywords:** Quality management, Public sector, Behavioral quality management, Technical Quality management

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## INTRODUCTION

The topic of the importance of quality management has generated extensive coverage over the years within the public sector as well as the private sector. In particular, adopting quality management practices has become mandatory in public corporations and institutions. The corporations and institutions in the public sector are operated with the government's financial support, and their main customers are citizens, so they need to ensure citizens are satisfied with their services. Therefore, adopting quality management is one of the ways used to increase revenue and enhance citizens' satisfaction with their services. In South Korea, there are already many corporations interested in quality management or business innovation. For example, a few public corporations already announced that they adopted Six Sigma and ISO9001 in the 2000s. Furthermore, there is a lot of news about case studies of state owned enterprises' (SOE) adopting quality management. However, not all corporations and institutions in the public sector have interest in quality management. They do not always announce the results of adopting quality management. As the Korean Ministry of Strategy and Finance encourages them to announce their business innovation to the public, it needs to make all public corporations and institutions realize how important quality management practices are. Thus, this study explores the effectiveness of the adoption of quality management practices and official announcements of such practices.

Quality management practices are classified into two types; behavioral quality management practices (BQ) and technical quality management practices (TQ) (Flynn et al. 1995; Powell 1995; Dow et al. 1999; Rahman and Bullock 2005; Naor et al. 2008; Cho et al. 2017). They also study the relationships between the two types of quality management and company performance. Many also paid attention to which type of quality management is more effective relative to corporate performance. Interestingly, those results and arguments have lacked a common thread. The purpose of this study is to clarify the clearer relationship among BQ, TQ, and company performance. This paper examines their relationships by analyzing data on Korean state-owned enterprises (SOE) and public institutions. This paper suggests how important adopting quality management is for the public sector and how the different types of

quality management practices work.

## LITERATURE REVIEW

### Quality Management Benefits in the Public Sector

The importance of quality management within the public sector has been shown to be remarkable through a number of studies. Milakovich (1991) mentions that launching Total Quality Management (TQM) is necessary in the American public sector at all levels. Berman and West (1995) argue that TQM application is connected to cost savings as well as meeting citizens' needs. In addition, QM implementation's importance in the public sector has been further emphasized in literature. Wynen (2015) says organizations in the public sectors faces new solutions and challenges in solving problems such as budgetary pressures and growing demand for financial accountability. To sum up the above, since the customers of corporations or institutions in the public sector are tax payers and the Federal government is a stake-holder in them, TQM implementation is important to ensure better financial performance and to raise customer satisfaction. Among several quality management practices, service quality management is emphasized as the most important practice for the public sector because it can lead to visible improvements for citizens (Domberger and Jensen 1997).

A lot of studies examine the relation between quality management and public corporations and institutions. Table 1 summarizes the empirical studies about the relation, and it shows how such studies compare internationally. Table 2 also shows the empirical studies emphasizing quality management implementation's importance in the Korean public sector. The object of their studies, dependent variables, and independent variables in them are all different, but they have shown the significant effects of the implementation of quality management in the public sector. Among those studies that had the same object as those in the public sector, the importance of service quality implementation is relatively more emphasized vs. other types of quality management practices. Significantly, most of the Korean studies show a relation between service quality practices and customer satisfaction. Moreover, their studies have only a single

**Table 1. Empirical studies about quality management for public sector**

| Author | Year | Object of the study | Dependent Variable | Factor |
|---|---|---|---|---|
| Nordstrom et al. | 1988 | City government | Efficiency of employee | Organizational Behavior Modification |
| Topár | 2007 | Public service institution | Business performance | QM |
| Zulanidi | 2009 | Malaysia local government | Financial performance | QM |
| Hartijasti | 2011 | State-Owned Enterprise | Planning Implementation Success | Top management Commitment |

**Table 2. Empirical studies about quality management for public sector 1**

| Author | Year | Object of the study | Dependent Variable | Factor |
|---|---|---|---|---|
| Shin and Jang | 2007 | Local public corporation | Financial performance | Service Quality |
| Jang | 2008 | KWACO | Performance | Environment System |
| Choi | 2012 | Korea Airports Corporation | Customer satisfaction | Business Innovation |
| Kim | 2012 | Korea Plant Service & Engineering (KPS) | Customer satisfaction | Service Quality |
| Kim | 2013 | Korail | Customer satisfaction | Service Quality |
| Kim | 2013 | Jeju Free International City Development Center | City image | Service Quality |

object in each study. Thus, we must study the relation by dividing quality management into two different types of practices such as BQ and TQ. We must also expand the objects of the studies.

### Behavioral QM and Technological QM

Since the early 1990s, quality management has been classified into behavioral quality management (BQ) and technical quality

management (TQ). The two types of quality management have been conceptualized by many studies. According to them, BQ is based on a customer focus and human resource focus, but TQ is based on information analysis or technology-driven practices (Flynn et al. 1995; Dow et al. 1999; Rahman and Bullock 2005; Naor et al. 2008; Dubey and Gunasekaran 2015; Cho et al. 2017). Quality management practices based on management commitment, relationships with suppliers and customers, and human resources belong to BQ (Flynn et al. 1995; Powell 1995; Rahman and Bullock 2005; Naor et al. 2008; Dubey and Gunasekaran 2015; Cho et al. 2017). On the other hand, using new machines or systems, technological improvements, and benchmarking are examples of TQ (Flynn et al. 1995; Powell 1995; Rahman and Bullock 2005). The researchers named the two types of quality management distinctively. For example, Flynn et al. (1995) and Naor et al. (2008) referred to 'infrastructure' as a behavioral quality management practice (BQ) because BQ refers to social practices. According to such research, the examples of infrastructure quality management are top management, supplier and customer relationships, workforce management and so on. The technical-driven quality management practices (TQ) are referred to as as 'core' practices because they were regarded as a basis of quality management like statistical control or product design at that time. Meanwhile, Dow et al. (1999) referred to BQ as 'people' and argued its key elements are focused on employee commitment and cooperative supplier relations. On the other hand, according to their study, TQ was termed a 'tool' and its key elements are using technological or systemic improvements (Dow et al. 1999). Rahmand and Bullock (2005) and Dubey and Gunasekaran (2015) divided into them into 'soft' practices and 'hard' practices. 'Soft' practice is considered the same as BQ, and it contains human resources-focused practice and relationships with partners and suppliers and so on. 'Hard' practice is considered the same as TQ, and its key elements include just-in-time principles and some computer-based technologies. Powell (1995) also defined BQ as 'intangible', and TQ as 'tangible'. Therefore, even though the researchers referred differently to the two types of quality management as BQ and TQ, they similarly classified them into two clusters based on quality management characteristics. Since the latest paper handled the classification using the terms BQ and TQ, the terms this paper uses are BQ and TQ.

Most of the studies defining the types of quality management are more are about conceptualizing the two types or examining the relationship between them. According to Flynn et al. (1995) and Rahman and Bullock (2005), two direct effects are indicated among BQ, TQ, and performance. The first effect is between BQ and TQ, and the other is between TQ and performance. This means the relation between BQ and performance is only indirect. Some researchers compare BQ and TQ's effects and results and find that BQ is more significant to corporate performance (Powell 1995; Dow et al. 1999; Naor et al. 2008; Dubey and Gunasekaran 2015). The most recent study investigates whether BQ has a mediation effect on TQ and company performance (Cho et al. 2017). It is notable that those empirical studies' results and arguments are each different and unrelated.

**Performance in the Public Sector**

Before establishing hypotheses for this research, organizational performance should be defined clearly by the previous papers in quality management studies and in the area of public sector studies. Generally, quality management research studies have used financial performance, customer satisfaction, and quality level to indicate organizational performance. Financial performance is the most commonly used indicator to indicate a firm's performance in many quality management papers (Adam et al. 1997; Samson and Terziovski 1999; Lakhal, Pasin, and Liman 2006; Akgün et al. 2014; Cho and Jung 2014; Cho et al. 2017). The papers which examined the relationship between the level of quality management and organizational performance of public sector corporations or institutions also used financial performance as a yardstick (Said et al. 2009; Shin and Chang 2007). To measure how well state-owned enterprises (SOEs) and institutions perform financially in the Korean public sector, there are financial indices such as a profitability and safety index, growth index, productivity index, activity index, and completeness per person index. Table 3 shows the index used for financial performance by research which used Korean SOEs or public institutions as an object of their studies. ROA is the indicator most used in those studies, and some research uses other indexes such as operating profit growth rate, sales, customer satisfaction and so on. In conclusion, since ROA is the

**Table 3. Studies using financial performance for public sector**

| Index | | Won (2008) | Yu (2008) | Yoo (2012) | Jeon (2012) | Shin (2012) | Kim (2014) | Hoh (2015) | Cho (2015) | Eum (2016) |
|---|---|---|---|---|---|---|---|---|---|---|
| Profitability measures | Operating Profit Ratio | | | | X | | | | | X |
| | ROS | X | | X | X | X | | | X | X |
| | ROA | X | X | X | X | | | X | X | |
| | ROE | | | X | X | | | | | |
| Stability measures | Debit Ratio | | X | | | | | | | |
| Competi-tiveness indicators per person | Sales per Employee | | | | | | X | | | X |
| Others | Operating Profit growth Rate | | X | | | | | | | |
| | Sales | | | | | X | | | | |
| | Customer Satisfaction | | | | | | X | | | |
| | Net Profit | | | | | | | | X | |
| | Operating Margin growth | | | | | | | | X | |

most used in previous literature reviews, this paper also uses ROA as a dependent variable signifying financial performance. According to table 4, ROA often appeared as a financial performance index in overseas quality management research (Adams et al. 1997; Lakhal et al. 2006). However, sales growth is also used a lot to signify financial performance in quality management papers (Adams et al. 1997; Lakhal et al. 2006; Cho and Jung 2014; Cho et al. 2017), so this paper utilizes sales growth as a dependent variable to develop hypotheses.

In this paper, the Public-service Customer Satisfaction Index (PCSI) is used as a dependent variable to indicate how satisfied Korean citizens are with SOEs and institutions' service in the Korean public sector. PCSI is the model of customer satisfaction in the

**Table 4. Studies using financial performance for Quality Management Literature**

| | Adams et al. (1997) | Lakhal et al. (2006) | Akgün et al. (2014) | Cho and Jung (2014) | Dubey and Gunasekaran (2015) | Cho et al. (2017) |
|---|---|---|---|---|---|---|
| ROA | × | × | | | | |
| ROE | | | | | | |
| ROI | | × | × | | | |
| Net Profit | × | | | × | | × |
| Sales Growth | × | × | | × | | × |
| Market Share Growth | | | | × | | × |
| Margin Growth | | | × | | | |
| Earnings | | | × | | × | |

public sector. The reason why PCSI was developed is to supplement the distinct character of the public sector from existing customer satisfaction indices such as the Korean Customer Satisfaction Index (KCSI) and National Customer Satisfaction Index (NCSI) (Lee and Yi 2012). Unlike KCSI and NCSI, PCSI contains a customer satisfaction factor, service quality factor, disconfirmation factor, and even considers social responsibility. Because this paper limits the scope of the study to only Korean SOEs and institutions in the public sector, PCSI should be used to indicate the level of customer satisfaction that represents citizen satisfaction. According to Table 5, the satisfaction index score is still used a lot as a dependent variable as well as an independent variable in previous empirical studies. Therefore, in this paper, PCSI indices used to signify the customer satisfaction level of the objects of studies that consist of SOEs and institutions.

## HYPOTHESES

The overall research flow of this paper can be divided into two parts. The first part is to examine the relationship between quality management implementation status and organizational performance. The other part verifies the existence of an indirect effect

**Table 5. Studies using Customer Satisfaction Indices**

| Author | Year | Object of the study | Dependent Variable | Factor |
|---|---|---|---|---|
| Koo | 2018 | Foodservice Company | KCSI, KNPS | Marketing Index |
| Deng et al. | 2013 | International tourist hotels | ACSI | Consumption emotions |
| Yi and Lee | 2010 | 142 Korean Firms in 53 different industries | Financial performance | KCSI and KNPS |
| Chong and Koo | 2011 | Korean hospitality and tourism firms | Customer satisfaction | NCSI |
| Cho and Kim | 2013 | Comparison KCSI, NCSI, KS-SQI | Financial performance (predictive power) | KCSI, NCSI, KS-SQI |
| Schneider et al. | 2009 | 44 companies in 5 different industries | Financial and market performance | ACSI |
| Park et al. | 2017 | Korean Airports Corporation | Financial Performance | Customer satisfaction (BSC Index) |
| Jeon and Kim | 2005 | Korean listed companies | Financial performance | KCSI |

of BQ between TQ and organizational performance. Based on the classification of quality management practices into BQ and TQ, this study investigates how those quality management practices influence the performances of SOEs and institutions in the public sector.

First, this paper examines whether quality management implementation helps to improve the financial performance of SOEs and public institutions. Over the last few decades, a lot of studies have emphasized the importance of total quality management (TQM) implementation regardless of the type of practice. They found statically causal relations between TQM and financial performance (Adam et al. 1997; Hendricks and Singhal 1997). In addition, ROA and sales growth are set as dependent variables to indicate the financial performance of Korean SOEs and public institutions in the literature review. Thus, based on the above descriptions, this paper develops the following two hypotheses:

**H1:** SOEs and institutions in the public sector which have official announcements about QM fulfillment witness a positive effect on their ROA.

**H2:** SOEs and institutions in public sector which have official announcements about QM fulfillment witness a positive effect on their sales growth.

Second, not only financial performance but also customer satisfaction should be regarded as an indicator of managerial performance of SOEs and institutions in the public sector. As the literature mentioned SOEs and public institutions' customer satisfaction level is directly linked to the voice of citizens, facoring in customer satisfaction using PCSI is crucial. Therefore, hypothesis 3 was developed to test how related quality management implementation is to customer satisfaction in terms of PCSI. Based on the above, this paper hypothesizes the following:

**H3:** SOEs and institutions in the public sector which have official announcements about QM fulfillment witness a positive effect on their PCSI.

The announcements about Korean SOEs and public institutions' quality management practices provide information on how the practices are carried out, so the notices about their practices can be classified by characteristics. They can be grouped into two types of quality management such as BQ and TQ by previous definitions from previous research studies. However, according to the literature review, the results and arguments about the relationship among BQ, TQ, and company performance are fragmentated. For example, Lakhal et al. (2006) showed that TQ is directly related to financial performance. On the other hand, BQ was directly related to financial performance as well (Adam 1997; Powell 2005; Lakahal et al. 2006). To discover clearer trends from previous literature, this paper analyzes the mediation effect among BQ, TQ, and Korean SOEs and public institutions' performance. Cho et al. (2017) found proof of BQ's mediation effect between TQ and corporate performance in a sample group of U.S. organizations. The analysis they employed in their study was from Baron and Kenny's (1986) mediation analysis technique. In line with the above research, therefore, this paper examines if BQ has a mediation effect in both groups by using Baron and Kenny's (1986) analysis. Furthermore, ROA and sales

growth, which are adopted in the previous hypotheses, are also used to reflect financial performance. Thus, this paper hypothesis the following. Additionally, based on Baron and Kenny (1985)'s technique, the three steps below are needed to prove Hypothesis 4 and Hypothesis 5.

**H4:** There is a mediation effect of BQ on the relationship between TQ and ROA.

**H4a:** TQ has a positive effect on ROA.

**H4b:** TQ has a positive effect on BQ.

**H4c:** BQ has a positive effect on ROA.

**H5:** There is a mediation effect of BQ on the relationship between TQ and sales growth.

**H5a:** TQ has a positive effect on sales growth.

**H5b:** TQ has a positive effect on BQ.

**H5c:** BQ has a positive effect on sales growth.

Finally, in line with the importance of customer satisfaction from QM and the public sector literature review, the mediation effect should be tested in terms of BQ, TQ, and customer satisfaction. Adam et al (1997) and Choi and Eboch (1998) have found that TQ has a positive effect directly on customer satisfaction levels. On the other hand, according to Samson and Terziovski (1999) andGrandzol and Gershon (1997), BQ is also directly related to customer satisfaction. To establish a clear argument from these discrete results, the mediation effect analysis developed by Baron and Kenny (1985) is needed. Lakhal et al. (2006) found that BQ inherent in 'infrastructure' practices in their article has a significant indirect effect on performance. Especially, employee training practices which are grouped under BQ are mediated between 'core' practices and operational performance. The paper also examines whether BQ serves as a mediator between TQ and customer satisfaction by relating them to the PCSI of Korean SOEs and public institutions. Hence, this paper hypothesis the following. Additionally, based on Baron and Kenny (1985)'s technique, that the three steps below are needed to prove Hypothesis 6.

**H6:** There is a mediation effect of BQ on the relationship between TQ and PCSI.

**H6a:** TQ has a positive effect on PCSI.

**H6b:** TQ has a positive effect on BQ.

**H6c:** BQ has a positive effect on PCSI.

## MEASUREMENT AND ANALYSIS

### Data Collection

In Korea, there are 338 public institutions and they are classified into 3 groups: SOE, para-government agency, and others. According to the Korean Ministry of Strategy and Finance's 2018 announcement, there are 35 public corporations. They each have more than 50 employees and their own resources account for more than half of their revenue. In 2018, the number of para-government agencies totaled 93 and they each have more than 50 employees as well, but they do not belong to the SOE group due to their financial operations. Hence, the objects of this study are limited to those two groups of SOEs and para government agencies known as public institutions in this paper. However, some SOEs and public institutions are subsidiaries of a main or bigger SOE and it is hard to acquire financial or PCSI data from them, so 26 of 35 public corporations and 74 of 95 public institutions (para-government agencies) are deemed the objects of this study.

The time range is set to the 5 years from 2013 to 2017. This adequate time range enables the study to create a pooled time-series data and a cross-sectional study (Shin 2009). Therefore, 130 samples of the SOE group and 370 samples of the para-government agency group are used in this study.

Currently, the Korean Ministry of Strategy and Finance requires all corporations and institutions in the public sector to announce officially how they run their business operations. They release official notices about what they have done to improve their quality management and what results are derived through a system called the All Public Information In-One (ALIO). The public as well as the government can look up information via the business innovation tabl example through the ALIO website. Hence, it is relatively easy to get and analyze data about quality management practices. In addition, all financial data are from KisValue and All Public Information In-One (ALIO). All PCSI data are also acquired from ALIO.

### Time-lag Specification

To verify hypothesis 1, 2, and 3, time-lag specification should be considered. In other words, time-lag specification is used to analyze

**Table 6. Literatures considering time lag specification**

| | Author | Used Dependent Variables with time lag |
|---|---|---|
| International | Adam et al. (1997) | $Profit_{t-1}$, $ROA_{t-3}$, $Sales\ Growth_{t-3}$ |
| | Levine and Toffel (2010) | $Employment_{t-k}$, $Sales_{t-k}$ ($k$ = 1, 2, 3, 4, 5, 6, 7, 8, 9) |
| | Coad and Rao (2008) | $Patents_t$, $Sales_{t-1}$ |
| Domestic | Kim and Hong (2011) | $Profit_{t-1}$, $Sales\ Growth_{t-1}$ |
| | Eum (2016) | $ROS_{t-k}$, $Sales\ per\ Employee_{t-k}$ ($k$ = 1, 2, 3) |
| | Choi (2016) | $ROA_{t-t}$ $ROA_{t-1}$, $PCSI_t$, $PCSI_{t-1}$, $EVAL_{t-}$, $EVAL_{t-1}$ |

the relationship between quality management implementation status and financial performance. There is a lot of QM literature which shows QM's effect by considering time-lag specification. Table # summarizes empirical studies about QM or business innovations regarding time-lag specification. According to table 6, in the previous literature, the periods used to consider time-lag specification are different and varied. However, examining the 1-year time-lag is the broadest variable to be used, so this paper also deals with the 1-year time-lag to prove hypothesis 1, 2, and 3. Accordingly, thus, this study analyzes two times to verify hypothesis 1, 2, and 3. The first step is to examine the relationship between quality management implementation status and financial performance in the same year. Second, examine the relationship between implementation status and financial performance one year after implementation. This study also compares those two results and shows which results in a more significant effect.

**Measures**

To prove the above hypotheses, variables implying QM implementation should be used as independent variables, and binary values are equivalent to the dummy variable. The value of the variable can be acquired by checking all official announcements about new QM practices through ALIO. In other words, if SOEs and public

institutions have implemented quality management practices and announced such measure through ALIO, the corresponding value is 1. Otherwise, if not, the corresponding value is 0. As such, this paper should subdivide the variable into two variables such as the BQ variable and TQ variable by identifying how they implemented quality management practices. Checking the status of the practices and dividing them into these two variables based on the definition provided by the previous literature is performed manually.

Annual ROA, sales growth, and PCSI variables of SOEs and public institutions are needed. Asset size, the number of employees and age are used as control variables. Additionally, according to the Korean Ministry of Strategy and Finance's 2018 announcement, all the sample SOEs and public institutions can be classified into 4 different types such as 'market SOE,' 'non-market SOE,' 'fund management public institutions,' and 'consigned execution agency.' Hence, those divisions are regarded as control variables.

**Modeling**

By using all these variables, the regression model for hypothesis 1 follows equation 1.

*Equation 1*

$$Y = \beta_0 + \sum_{k=1}^{k} \beta_{it} X_{it} + \varepsilon_{it}$$

$i$ = 1, 2, 3 … N: Sample units of the panel, $t$ = 1, 2, 3, 4, 5: time period of sample

First, Y signifies dependent variables such as ROA, sales growth, and PCSI in line with the hypotheses. X indicates the status of QM implementation for hypothesis 1, 2, and 3, then X also signifies BQ, TQ, and control variables. The three control variables indicating the size of the objects are in natural logarithms, because they are in the high dynamic range. i is a sample unit of the panel and t indicates the time-period of sample.

### Analysis

To find the most suitable panel regression model, this paper enforces two tests; the Breusch-Pegan Test and the Hausman Test. First, through the Breusch-Pegan Test, this paper checks if the pooled OLS model is appropriate. The result of the Breusch-Pegan Test is that all p-values of the models for hypothesis 1, 2, and 3 are under 0.05, so the random effect model should be selected. Next, verify which model is more appropriate for analysis between the fixed effect model and random effect model. The result of the Hausman Test is that all p-values of the three models for hypothesis 1, 2, and 3 are over 0.05. The p-values of other models considering the 1-year time-lag are also over 0.05. If the p-value is significant, a fixed effect model should be selected, if not using a random effect (Wooldridge 2010). Hence, all hypotheses should select the random effect model rather than a fixed effect model.

To verify the mediation effect for the last hypotheses, mediation analysis should be used. Baron and Kenny Analysis (1986) has been broadly used, so this paper adopts it. As the Hypotheses section mentioned, three conditions are established by Baron and Kenny's (1986) technique, before they are proved. In addition, the Sobel test (1982) is conducted for double checking the mediation effect.

## RESULTS

### QM Implementation Status and Performance

Hypothesis 1 and 2 predicts that there is a significant relationship between quality management implementation status and financial performance. Table 7 and table 8 show the results of hypothesis 1 and 2. In the basic model of hypothesis 1 regarding the relation within ROA of the same year, the coefficient of implementation status is 5.09 and is significant at the 0.01 level. In the second model regarding 1-year time-lag specification, the coefficient value of the implementation status is 4.86 and is significant at the 0.1 level. The gap between those two coefficient's values is 0.719. Therefore, they completely support hypothesis 1. On the other hand, the model of hypothesis 2 regarding the relation within sales growth of the same year does not yield significant results. However,

**Table 7. Estimated Coefficients from regression for Hypothesis 1**

| Dependent variable: ROA | | Random Effect Model |
|---|---|---|
| | Estimate | Estimate with time lag of 1 year |
| (Intercept) | -3.86 | -2.77 |
| Implementation Status | 5.09 ** | 4.80 · |
| Ln (Asset) | -0.16 | -0.11 |
| Ln (Employee) | 0.23 | 0.25 |
| Ln (Age) | 0.48 | -0.29 |
| Type 1 | 3.91 | 3.73 |
| Type 2 | 0.35 | 1.83 |
| Type 3 | 5.26 | 5.41 |
| N = | 500 | 400 |

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1

**Table 8. Estimated Coefficients from regression for Hypothesis 2**

| Dependent variable: Sales growth | | Random Effect Model |
|---|---|---|
| | Estimate | Estimate with time lag of 1 year |
| (Intercept) | 18.78 | 15.12 |
| Implementation Status | -1.53 | 5.88 * |
| Ln (Asset) | -0.70 | -0.66 |
| Ln (Employee) | 0.02 | 0.15 |
| Ln (Age) | -1.84 | -1.59 |
| Type 1 | -2.66 | -1.72 |
| Type 2 | -1.14 | 12.85 * |
| Type 3 | -1.93 | -0.52 |
| N = | 396 | 396 |

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1

interestingly, in the model of the hypothesis considering the 1-year time-lag specification, the coefficient value of implementation status is 5.88 and is significant at the 0.05 level. Thus, hypothesis 2 is accepted partially and these results show that implementing QM and announcing its associated results is positive only in terms of sales growth a year later.

**Table 9. Estimated Coefficients from regression for Hypothesis 3**

| Dependent variable: PCSI | | Random Effect Model |
|---|---|---|
| | Estimate | Estimate with time lag of 1 year |
| (Intercept) | 29.86 ** | 1.20 *** |
| Implementation Status | 4.93 * | 0.11 |
| Ln (Asset) | 2.70 *** | 0.07 ** |
| Ln (Employee) | 1.94 | 0.02 |
| Ln (Age) | 2.29 | 0.09 |
| Type 1 | -2.60 · | 0.43 · |
| Type 2 | 10.85 ** | 0.24 * |
| Type 3 | 5.67 * | 0.13 |
| N = | 366 | 366 |

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1

Hypothesis 3 predicts SOEs and institutions in the public sector which enforce and announce QM fulfillment witness a positive effect on their PCSI. According to table 9, the only model considering the relation within PCSI of the same year yields significant result; its coefficient is 4.93 and is significant at the 0.05 level. On the other hand, the model which considered the relation within Sales PCSI a year later does not yield significant results. Hence, the above results confirm hypothesis 3 partially, they show there is relationship between only PCSI of the same year and QM implementation status.

**Mediation effect of Behavioral quality management (BQ)**

Hypothesis 4, 5, and 6 posits BQ's mediation effect between TQ and performance. Table 10 presents the result of hypothesis 4. In accordance with Baron and Kenny's (1986) mediation analysis, all steps for hypothesis 4 are significant models. In table 10, TQ has a direct effect in terms of financial performance ROA (coefficient value of 3.85 in Step a) and it also has a direct effect on BQ (coefficient value of 0.74 in Step b). In the third model with both TQ and BQ variables as independent variables and mediation variables, only the BQ mediation variable is significant with ROA (coefficient value of 5.30). This means BQ has a full mediating influence between TQ and financial performance ROA (Baron and Kenny 1986). The result

**Table 10. The result for mediation analysis of BQ between TQ and ROA**

| Step | Dependent Variable | Independent (Mediation) Variable | Estimate | P-value |
|---|---|---|---|---|
| a | ROA | TQ | 3. 85 · | 0.08 |
| b | BQ | TQ | 0.74 *** | 0.000 |
| c | ROA | TQ | -0.07 | 0.82 |
| | | (BQ) | 5.30 · | 0.08 |

**Table 11. The result for mediation analysis of BQ between TQ and Sales growth**

| Step | Dependent Variable | Independent (Mediation) Variable | Estimate | P-value |
|---|---|---|---|---|
| a | Sales growth | TQ | 4.2 · | 0.09 |
| b | BQ | TQ | 0.74 *** | 0.000 |
| c | Sales growth | TQ | -0.60 | 0.85 |
| | | (BQ) | 6.69 · | 0.05 |

value from the Sobel test is 2.76, so it also supports hypothesis 4. Therefore, this result offer definitive support for hypothesis 4.

Similarly, according to table 11, TQ has a direct effect on financial performance in the form of sales growth (coefficient value of 4.2 in Step a) and it also has a direct effect on BQ (coefficient value of 0.74 in Step b). In the third model with both TQ and BQ variables as independent variables and mediation variables, only the BQ mediation variable is significant with sales growth (coefficient value of 6.69). Like the results of hypothesis 4, BQ has a full mediating influence between TQ and financial performance in the form of sales growth as well (Baron and Kenn 1986). Furthermore, the result value from the Sobel test is 2.51, so it shows a significant mediation effect as well. Thus, hypothesis 5 is also accepted.

Lastly, table 12 offers the results of hypothesis 6 considering BQ's mediation effect between TQ and customer satisfaction. According to table 12, TQ is directly related to BQ (coefficient value of 4.2 in Step a) and it also has a direct effect on PCSI (coefficient value of 0.74 in Step b). The third model used TQ and BQ variables as independent variables and mediation variables, with only the BQ mediation variable as significant in terms of PCSI (coefficient value

**Table 12. The result for mediation analysis of BQ between TQ and PCSI**

| Step | Dependent Variable | Independent (Mediation) Variable | Estimate | P-value |
|---|---|---|---|---|
| a | PCSI | TQ | 4.1 · | 0.09 |
| b | BQ | TQ | 0.74 *** | < 2.2e-16 |
| c | PCSI | TQ | -0.72 | 0.82 |
| | | (BQ) | 6.68 * | 0.08 |

of 6.68). The result value from the Sobel test is 2.7, so it responds to the mediation effect of BQ between TQ and PCSI. Hence, the results support hypothesis 6 likewise.

## DISCUSSION

The literature on quality management in the public sector provides many measures and validation of why it is important. This study is also based on those measures and developed for the same purpose. Thus, this study contributes to the literature on quality management. Moreover, in line with Cho et al.'s (2017) results and implications, this study shows BQ's mediation effect on the relationship between TQ and financial performance. Each different result from the two sample groups also has managerial implications.

### Contribution to Quality Management Literature

It is true that there are a number of the empirical studies about quality management in the public sector domestically as well as internationally. Most of them emphasize the importance of implementing quality management. However, most of them target one object such as a public corporation or institution. Besides, they are based on surveys and the dependent variable is typically customer satisfaction instead of financial performance. On the other hand, this study uses quantitative data in the form of financial performance and PCSIs for the past 5 years. Besides, interestingly, even though this distinguishes implementation status in binary form (1 or 0), it completely supports hypothesis 1, 2, and 3. It is notable that the variables in the models do not reflect how the objects

implement quality management. All the measures about quality management in the model are simply binary. They are classified into two types of quality management as well based on the literature, but they do not reflect how much they pay or the timeframe for implementation in detail. Although the binary measures in this study consist of simply 1 or 0 based on the implementation status, they respond to the general argument of quality management (QM) literature that QM implementation influences the performance of the public sector positively.

From another theoretical standpoint, the results of this study contribute to the literature conceptualizing the two types of quality management such as behavioral quality management (BQ) and technical quality management (TQ). Even though they do not use the same terms, they classify quality management practices similarly based on their characteristics and investigate the relationship between those two quality management practices and company performance. Their results and arguments are diverse. Some research argues that only BQ has an effect on firm performance, whereas others investigate if there is a direct effect or indirect effect among BQ, TQ, and company performance. Cho et al. (2017) finds BQ's indirect effect on the relationship between TQ and corporate performance within the U.S. sample group. Similarly, Rahman and Bullock (2005) show BQ indirectly influences the relationship between TQ and Australian manufacturing firms' performance. In this study, the results for the public corporation group samples are in line with those arguments. Meanwhile, most of empirical research about the relationship between those two quality management practices and company performance use surveys to measure how corporations implement QM. The measures for firm performance are also based on surveys or interviews that ask the respondents how they feel about the firm's quality outcomes or customer satisfaction. However, this study uses quantitative measures and then verifies the relationship between the two quality management practices and performance.

**Different Results When Time-lag is adopted**

Even though Hypothesis 1 and 2 regard financial performance such as ROA and sales growth, the results are a little different. Hypothesis 2 is accepted partially because implementing QM and

announcing results are positive only in terms of sales growth a year later. Sales growth index is influenced by sales amount a year earlier. Hence, it is possible that if the sales amount is already significant, it is not easy to achieve a higher growth rate the following year even if QM is implemented. In addition, this research is based on the content of SOEs and public institutions' official announcements, so it is not necessarily clear as to when their QM implementations started in actual practice. It is possible that they adopted QM practices in the late second half of the year or the following year after they were announced. Furthermore, this paper cannot grasp whether they were run well for a year or not. As such, the effect of QM implementation cannot be shown.

Hypothesis 3 signifying the relation between QM implementation and PCSI is also accepted partially. According to the results of hypothesis 3, only the first model for PCSI of same year shows the effect of QM implementation. PCSI is evaluated every year. Moreover, PCSI reflects the degree of customer satisfaction with the quality services applied to the same year. Hence, it is possible to predict how the implementation of QM will affect only the PCSI of the same year.

**Evidence of BQ's mediation effect between TQ and firm performance**

From the middle of the 2000s, studies emerged considering the mediation effect of two different types of QM practices (BQ and TQ). As the literature review section mentioned, BQ practices such as employee training have an indirect effect on financial and operational performance (Lakhal et al. 2006). Mahmud and Hilmi (2013) also argued that BQ practices based on human resources play a mediating role in TQM practices and small and medium-sized enterprises. Cho et al. (2017) showed the TQ à BQ à Company performance path in the U.S. sample group and emphasized BQs mediating role. Thus, the results of this study are somewhat similar to those previous research studies. Specifically, the results of Lakhal et al. (2006) and Cho et al. (2017) are compared with this studys mediation result in this part.

Figure 1 shows summaries of the two previous studies' results and the result of hypothesis 4 and 5. To be specific, in figure 1, on the third row, the two diagrams show the results of each third step of hypothesis 4 and 5. When the model considers both TQ and

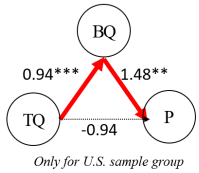
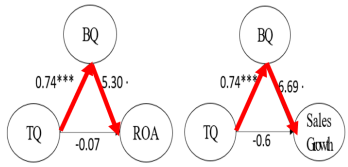
| Lakhal et al. (2006) | Cho et al. (2017) | H4 & H5 Results |
|---|---|---|
| BQ's Indirect effect | BQ's Mediation Effect | BQ's Mediation effect |
| Organization for quality (0.22*)<br>Employee training (0.19 *)<br>Employee participation (0.15*)<br>Customer focus (-) |  |  |
| Plastics transformation industry in Tunisia | Manufacturing and service industry in US and China | Various industries (SOC, Service etc.) in Korean public sector |

**Figure 1. Comparison the Results of Hypothesis 4 & 5 with Two Literatures**

BQ in accordance with Baron and Kenny's (1986) third step, the coefficient value of TQ is negative and becomes insignificant as well. The result is relatively analogous to Cho et al. (2017)'s result from the U.S. sample group that emphasizes the full mediation effect of BQ between TQ and corporate performance. Rather, Lakhal et al. (2006) shows that only three factors of BQ practices have an indirect effect on financial performance. It is predictable that the reason why the results of hypothesis 4 and 5 are similar to Cho et al. (2017) is the samples' industries. Lakhal et al. (2006) used the samples in the only manufacturing industry in Tunisia. On the other hand, Cho et al. (2017) used the samples in both manufacturing and service industries in the U.S. and China, ensuring the mediation effect appeared in only the U.S. sample group. The samples used in this paper are in various industries such as power generation and services in the Korean public sector. In conclusion, since they correspond more with the samples of Cho et al. (2017) than Lakhal et al. (2006), the results of this study are more analogous to Cho et al. (2017).

Besides, Cho et al. (2017) argues that the mediation effect of BQ practices can appear in the U.S. sample group where QM programs are relatively more mature, and they regard BQ practices as "order-winners". However, China-based companies are not yet at that stage, so they still generalize TQ practices as "order-winners". In line with this argument, it is possible to predict that Korean SOEs and public institutions regard BQ practices as "order-winners" rather than TQ practices to focus on customer satisfaction or human resources. It is also possible to predict the high level of maturity of QM practices

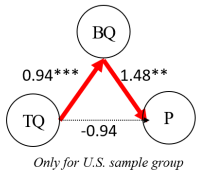
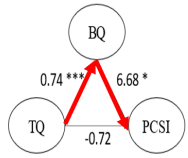
| Lakhal et al. (2006) | Cho et al. (2017) | H4 & H5 Results |
|---|---|---|
| BQ's Indirect effect | BQ's Mediation Effect | BQ's Mediation effect |
| Organization for quality (0.26*)<br>employee training (0.20 *)<br>Employee participation (-)<br>Customer focus (-) |  <br>*Only for U.S. sample group* |  |
| Plastics transformation industry in Tunisia | Manufacturing and service industry in US and China | Various industries (SOC, Service etc.) in Korean public sector |

**Figure 2. Comparison the Results of Hypothesis 6 with Two Literatures**

implemented in the Korean public sector.

Figure 2 shows summaries of the two previous studies' results and the results of hypothesis 6 that consider PCSI as a dependent variable. In figure 2, on the third row, the diagram shows the results of the third step of hypothesis 6. When the model considers both TQ and BQ in accordance with Baron and Kenny's (1986) last step, the coefficient value of TQ is under 0 and it is insignificant. Thus, the results of hypothesis 6 is still significantly different with the results of Lakhal et al. (2006) rather than Cho et al. (2017). There are differences not only in the samples' industries but also in factors signifying BQ practices. According to Lakhal et al. (2006), the factors signifying BQ practices are based on minor human resource practices, because they are organized for quality, employee training, employee participation, and customer focus. On the other hand, Cho et al. (2017)'s BQ practices acknowledge more auditory factors in the form of management commitment and involvement from suppliers. Thus, although the model of this study does not reflect how and what BQ practices are, it is predictable that BQ practices of the Korean public sector correspond more to relationships with stakeholders as well as human resources.

## LIMITATIONS AND FUTURE RESERACH

First, the variables indicating implementation quality management (QM) status are relatively simple, because they are binary. The models used in this study do not take into consideration the size or period of QM implementation. The results would be totally different

and provide more specific managerial implications by regarding how effectively or actively QM implementation is conducted. The result of hypothesis 2 considering the 1-year time-lag specification is not significant. If the size or period of QM implementation is examined as well, the reason for the partial support of hypothesis 2 will be proved. Therefore, future research needs to use more specific measures beyond classifying QM into two types of quality management practices. It should explore how deeply or for how long QM practices are implemented in each corporation or agency.

A further limitation of our research is the difficulty of selecting the objects of the study. This study uses some public corporations and para-government agencies based on the standard set by the Korean Ministry of Strategy and Finance. The samples are not for all corporations and agencies in those groups because of the difficulty of collecting data. Moreover, in fact, there are size variances among even similar public corporations and some among other public institutions which are not included in this study which are run like corporations. Thus, it would be useful for future research to include more institutions in the public sector. In turn, the sample also can be divided by another standardization.

Finally, there is an ambiguity in selecting as the dependent variables ROA, sales growth, and PCSI for use in this study. Since they are the most used variables to investigate performance in previous literature, they are used in this study. However, they are not the only measures which can evalaute a firm's financial performance. Furthermore, the majority of literature used for developing hypotheses is from the public administration field, so the suitability of using ROA in business must be verified. Therefore, future research should be developed by using more diverse performance measures.

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