

TOTAL QUALITY MANAGEMENT, BALANCED SCORECARD AND PERFORMANCE

Mahfud Sholihin

*Accounting Department Universitas Gadjah Mada
e-mail: mahfud_s@yahoo.com*

Ayu Chairina Laksmi

*Accounting Department Universitas Islam Indonesia
e-mail: ayucl@fe.uui.ac.id*

Abstract

This study examines the relationship between Total Quality Management (TQM), Balanced Scorecard (BSC), and organizational performance. In particular, this study investigates whether TQM affects performance; and if so, whether the effect is influenced by BSC implementation. In examining the relationship between TQM, BSC and performance, this study proposes two different models, namely intervening/mediating model and moderating model. This study employs the intervening model to test whether the effect of TQM on performance is mediated by BSC. On the other hand, this study uses the moderating model to examine whether BSC moderates the relationship between TQM and performance. The results of this study demonstrate that both TQM and BSC are positively and significantly associated with performance. The path analysis reveals that partially, BSC mediates the relationship between TQM and performance. The results of moderated regression analysis, however, indicate there is no moderating effect of BSC on the relationship between TQM and performance. Thus, the results of this study provide support for the intervening model, but not for the moderating model. The results, however, should be interpreted cautiously due to the limitations contained in this study.

Keywords: *Balanced Scorecard, Total Quality Management, performance*

Abstrak

Penelitian ini meneliti hubungan antara Total Quality Management (TQM), Balanced Scorecard (BSC), dan kinerja organisasi. Secara khusus, penelitian ini menyelidiki apakah TQM berpengaruh pada kinerja; dan jika demikian, apakah pengaruh tersebut mempengaruhi penerapan BSC. Dalam meneliti hubungan TQM, BSC, dan kinerja, penelitian ini mengajukan dua model berbeda yaitu model intervening/mediating dan model moderating. Penelitian ini menggunakan model intervening untuk menguji apakah pengaruh TQM terhadap kinerja dimediasi oleh BSC. Selain itu, penelitian ini juga menggunakan model moderating untuk menguji apakah BSC memoderasi hubungan antara TQM dan kinerja. Hasil penelitian ini menunjukkan bahwa baik TQM maupun BSC secara positif dan signifikan terkait dengan kinerja. Analisis path menunjukkan bahwa secara parsial BSC memediasi hubungan antara TQM dan kinerja. Meskipun demikian, hasil dari analisis regresi termoderasi mengindikasikan bahwa tidak ada pengaruh moderasi BSC pada hubungan antara TQM dan kinerja. Dengan demikian, hasil penelitian ini mendukung penggunaan model intervening, namun tidak mendukung model moderating. Meskipun demikian, penelitian ini harus diinterpretasi dengan teliti karena penelitian ini masih memiliki beberapa keterbatasan.

Kata kunci: *Balanced Scorecard, Total Quality Management, kinerja*

INTRODUCTION

Increasing globalization and competition in the market has driven companies to adopt various new approaches, such as Total Quality Management (TQM) and Balanced Scorecard (BSC), in managing their businesses. An analysis by Hoque (2003) suggests there is an interaction between TQM and BSC in affecting firm performance. The aim of this study is mainly to empirically test his proposition. In examining the relationship between TQM, BSC, and performance, this study proposes two different models, namely intervening and moderating effect models as portrayed in figures 1a and 1b, respectively. The test of the two models will enable us to understand how the mechanism of the interaction between TQM and BSC affecting performance. This understanding is important both for theoretical and practical reasons. By using the intervening model, this study will test whether the effect of TQM on performance is mediated by BSC. On the other hand, with the moderating model, this study will test whether BSC moderates the relationship between TQM and performance.

Those two models are examined in this study because they are "...conceptually distinct and should be analytically distinguished" (Bisbe and Otley, 2004, p. 712). Moreover,

previous empirical studies on the effect of TQM on performance provide support for the two models. An example of empirical support for the intervening model is provided by Kaynak (2003) who finds that there are direct and indirect effects of TQM practices on organizational performance. For the moderating model, supports are provided, among others, by Chenhall (1997); Hendrick and Singhall (2001); and Chong and Rundus (2004). Chenhall (1997) finds the effect of TQM on organizational performance is moderated by reliance on manufacturing performance measures. Hendrick and Singhall (2001) find the effect of TQM on performance is moderated by firms' characteristics, such as size and the maturity of TQM implementation. Meanwhile, Chong and Rundus (2004) discover that the effect of TQM on organizational performance is moderated by market competition.

The remainder of the paper is organized as follows. The next section of this paper will discuss literature review and hypotheses development. In section three, the research method will be discussed and this will be followed by research findings and discussion in section four. The final section will discuss conclusion, limitations and suggestions for future research.

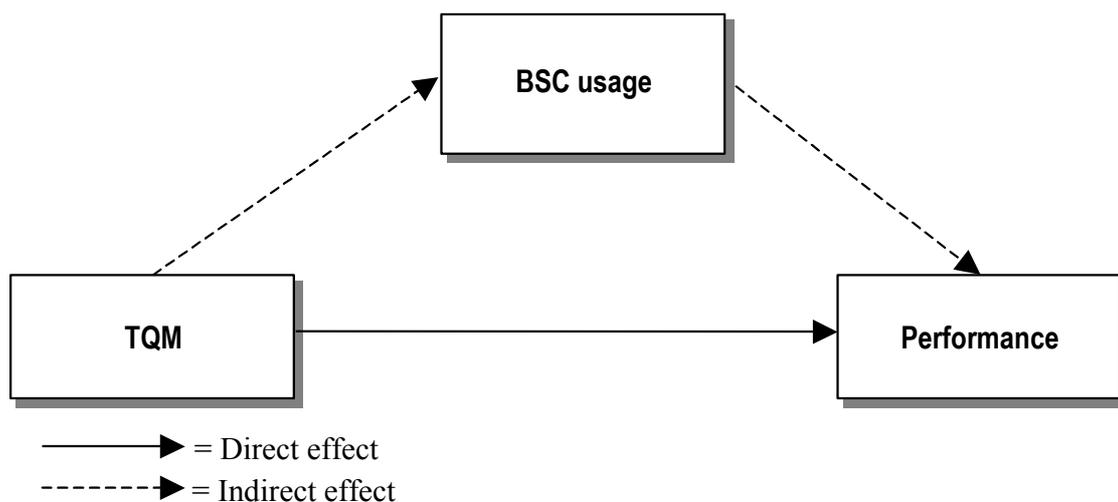


Figure 1.a: The Intervening effect of BSC on the relationship between TQM and performance

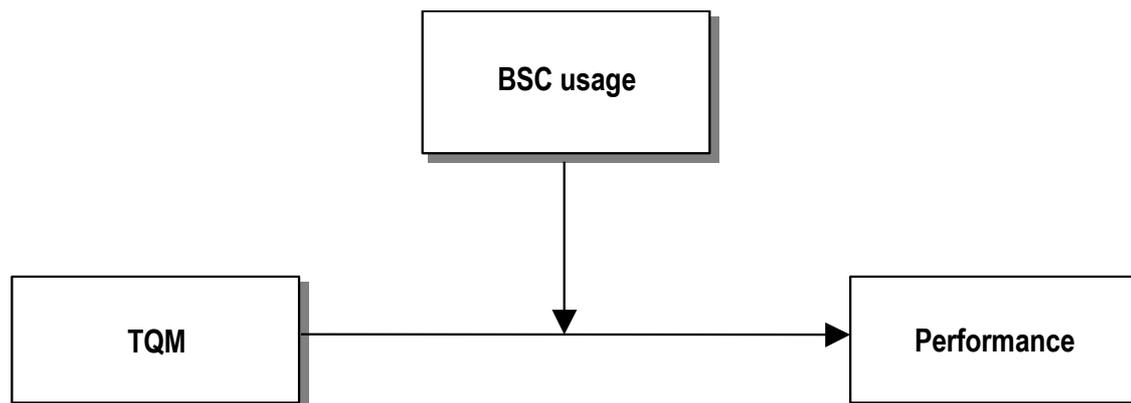


Figure 1.b: The Moderating effect of BSC on the relationship between TQM and performance

LITERATUR REVIEW AND HYPOTHESES DEVELOPMENT

TQM and performance

TQM is an integrated management philosophy and set of practices that emphasizes, among other things, continuous improvement, meeting customers' requirement, reducing rework, long range thinking, increased employee involvement and teamwork, process redesign, competitive benchmarking, team-based problem-solving, constant measurement of results, and closer relationships with suppliers (Ross, 1994). Similarly, Oakland (1993, p. 22) defines TQM as "...an approach to improving the competitiveness, effectiveness and flexibility of a whole organization". As maintained by Wilkinson *et al.* (1992), the most convincing reason for many businesses in adopting TQM is its promises to increase long-term business performance and profitability. The followers of TQM assert that, managers can implement TQM in any organizations and that it generates improved products and services, reduced costs, more satisfied customers and employees, and improved bottom line financial performance (Walton, 1986). However, critics suggest that TQM implementation involves significant costs and obstacles (Powell, 1995). In addition, there is also a concern that the impact of TQM on performance is not conclusive (Errikson and Hansson, 2003).

Mathews and Katel (1992) elucidate that TQM depends on small teams of workers to clean up poor procedures and work habits

and it is used to be seen as the doctrine that would rescue many businesses from loose management technique and poor products. On the other hand, many executives and consultants have moved on to other methods, and while some organizations still believe in TQM, it has slipped badly over its premature and overstated expectations. Fuchsberg (1992) finds that many corporate quality programs are failing and the main reason for the failures is that the programs are vague. Fuchsberg (1993) also maintains that small companies are struggling to keep up with big-business strategy such as TQM. Some small businesses are just not impressed with latest management trends and they only adopt total quality practices after being pressurized by their big clients. There even a case of a small firm, that has been very successful in implementing TQM, that ends up filing for bankruptcy (Hill, 1993). In brief, many companies have been disappointed with TQM (Fuchsberg, 1993).

Despite the criticisms, some evidence suggests that TQM do increase performance. Errikson and Hansson (2003) investigate the impact of TQM on financial performance in Swedish companies. In particular, they compare between Swedish quality award recipients to branch indices and to identified competitors. The results demonstrate that during the TQM implementation period, the award recipients do not necessarily perform better than their competitors and the branch indices. In contrast, the award recipients perform better than their competitors and branch indices

on all studied indicators during the post implementation period. The findings indicate that the financial performance, measured by the indicators of change in sales, change in number of employees, and return on sales, develop more advantageous for companies that have successfully implemented TQM, than their branch indices and indicated competitors.

Another positive relationship between TQM and performance is found by Prajogo and Brown (2004). Prajogo and Brown (2004) investigate the relationship between TQM practices and quality performance in Australian organisations. In their study, Prajogo and Brown (2004) make a comparison between organisations which have adopted formal TQM and those who do not have formal TQM. The first result of the study suggests that TQM firms outperform non-TQM firms in most of the key elements of TQM practices as well as quality performance. However, the second part of data analysis suggests that a TQM program does not entirely impact quality performance since it only slightly improves process management and strategic planning. The third part of findings further negates the positive value of TQM programs by suggesting that it does not improve the total relationship between TQM practices and performance. Regardless of the mixed findings, the study by Prajogo and Brown (2004) provides important insights into the benefits of formal TQM programs implementation. Most importantly, the study reveals that TQM practices always show a significant predictive power on quality performance. Therefore, it is critical for organizations to seriously implement TQM principles as a set of practices rather than simply establishing formal TQM programs.

The study by Chong and Rundus (2004) also supports the positive effects of TQM practices on organization performance. In their study, Chong and Rundus (2004) examine the impact of market competition on the relationship between the use of TQM practices of customer focus, and product design and organizational performance. The results of the study show that market competition is another important contingent (moderating) variable.

This result supports the contingency theory, which is based on the common proposition that organizational performance is a consequence of the fit between two or more factors, such as an organization environment (i.e. market competition) and the adaptation of TQM practices. Hence, the adaptation of TQM practices and market competition jointly enhance organizational performance. In line with other TQM literature, the results of the study by Chong and Rundus (2004) also demonstrate that TQM practices are the primary determinant of quality performance. As quality performance improves, cycle times are reduced because there is less non-value added times resulting from the need to rework the defective products Chong and Rundus (2004).

A study by Kaynak (2003) examines the relationship among TQM practices and also to identify the direct and indirect effects of TQM practices on the various dimensions of performance. The findings as a whole suggest that a positive relationship exists between the extent to which companies implement TQM and firm performance. The findings of the study also show that assessment of management leadership is necessary when the effectiveness of TQM implementation is examined. The three TQM practices that have direct effect on operating performance (inventory management and quality performance) are supplier quality management, product/service design, and process management. Meanwhile, management leadership, training, employee relations, and quality data and reporting affect operating performance through supplier quality management, product/service design, and process management; and the positive effect of TQM practices on financial and market performance is mediated through operating performance. From the abovementioned literature review, it can be expected that *the TQM practice affects performance. However, it is likely that the effect of TQM on performance is influenced by other variables.*

TQM and BSC

Hoque (2003) argues that BSC usage is a natural follow up of the TQM implementa-

tion in a sense that while TQM is may be viewed as a strategic initiative, BSC is a system which provide information to support the decision making and evaluating that strategic initiative. Kaplan and Norton (1996, 2001) explain that by using both financial and non-financial performance measures, the balanced scorecard (BSC) approach focuses on a set of integrated strategic management ideas which appraise organizational performance from four dimensions: customers, financial (or shareholders), learning and growth, and internal business processes). Although the concept of balanced scorecard is not new (Epstein and Manzoni, 1998); Hoque (2003) argues that the approach can actually give benefits to organizations. Firstly, the BSC helps an organization translate its vision and strategies into operational measures. Secondly, it communicates strategies to all levels of the organization. The communication is improved by setting goals and linking rewards to performance. Thirdly, a BSC can combine strategic planning and operational budgeting through the allocation of resources (budgeting) to management initiatives in the strategic plan. Lastly, a BSC provides feedback and learning. When strategies are linked to objectives and measurement of objectives becomes a component of strategy evaluation, then this provides learning as to whether strategies are in fact working or whether changes need to be made. Hoque (2003) also comments that TQM firms should employ BSC to identify appropriate multidimensional, non-financial and financial, indicators to motivate and to reward employees for achieving desired outcomes, and also to encourage and to reward them for providing feedback on areas where improvements can be made.

Chenhall (1997) acknowledges that global competition leads firms to enhance their performance by adopting TQM and advances the notion that TQM should be developed in conjunction with management performance evaluation systems that employ measures of manufacturing processes. Sim and Killough (1998) find that performance gains can come from complementarities between

TQM and JIT and specific features of management accounting systems. They also maintain that there is a possibility that an important reason some firms have not experienced performance gains from implementing TQM and JIT is reliance on inappropriate management accounting systems. Although adherents of the BSC claim that it is suitable for implementation of any strategy, Hoque (2003) argues that a TQM firm needs a BSC-like performance management system if it wants to achieve continuous performance improvement. The literature suggests that there should be a link between strategy and management control systems and that a congruent match of the two variables is essential to performance (Govindarajan and Gupta, 1985; Simons, 1987). Likewise, a performance measurement system should promote actions that are congruent with organizational strategy (Whittington, 1993; Kaplan and Norton, 1996). Otherwise, strategic control systems can hinder performance (Ittner and Larcker, 1997).

Concerning the relationship between TQM and BSC, Hoque (2003) explains how all four dimensions of BSC can contribute to the effectiveness of TQM programs. BSC system integrates a wide range of performance indicators, financial as well as non-financial, which together can provide managers with continuous signals as to what is most important in their day-to-day work, and where efforts must be directed. Therefore, to achieve such strategic goals, TQM firms should implement a BSC to identify appropriate multidimensional, non-financial and financial, indicators so that employees are motivated and rewarded for achieving desired outcomes, and also encouraged and rewarded to provide feedback on areas where improvements can be made. By empowering employees to contribute towards achieving continuous performance improvement, TQM success can be achieved.

The strategic management accounting literature suggests that traditional accounting systems do not support the drivers of quality and the evaluation of drivers of quality, and that management control systems should change to support TQM (Langfield-Smith,

1997). Traditional accounting supports cost and production analysis well, but not quality analysis and problem solving (Hoque and Alam, 1999). This is because quality is driven by non-financial factors such as product design, process design, rework, and on-time delivery. Ittner and Larcker (1998) identify that achieving a balance requires managers to perform well on multiple dimensions. They recognise that managers need to focus on both financial and non-financial measures to achieve organisational goals, both at a strategic business unit level, and at the corporate level. However, under the traditional financial focus, management is incapable of taking a holistic view of how their actions correspond to organisations' strategic goals attainment. There is also a view that non-financial performance measures are better than financial performance (Ittner and Larcker, 1995, 1997; Ittner *et al.*, 1997; Banker *et al.*, 2000). Therefore, non-financial measures must supplement financial measures in providing support for TQM. Goals and objectives for non-financial factors can be set and measures used to provide feedback and rewards. BSC with its emphasis of supplementing financial information with non-financial information then supports TQM.

Yamin and Gunasekaran (1999) argue that the pursuit of continuous quality improvement requires firms to identify the cognitive needs of employees to create a shared values approach to quality, and must identify the cognitive needs of customers in order to understand their buying behaviours. Accordingly, to be successful, the firm must align the cognitive needs of its customers' values and resources. The whole drive of a TQM philosophy is that quality, and its management, have to be built in from the beginning and that the achievement of quality standards and improvement is the responsibility of everyone (Morgan and Murgatroyd, 1994). For that reason, it is crucial for TQM firms to have an appropriate strategic management control system such as BSC. Hence, it can be expected that *there is a relationship between TQM practices and BSC.*

BSC and performance

Kaplan and Norton (1993) contends that BSC may positively affect performance because the BSC is capable of providing continuous signals and motivating breakthrough improvements in critical activities in critical areas such as product, process, customer and market development. Moreover, the BSC can provide continuous signals since it incorporates both financial and non-financial measures. Financial measures provide information on past performance and, "indicate whether the company's strategy, implementation, and execution are contributing to bottom-line improvement" (Kaplan and Norton, 1992, p. 77). On the other hand, non-financial measures (e.g. customer, internal business process and innovation and learning perspectives) provide the information on the driver of future success (Kaplan and Norton, 1992, 1996a). Kaplan and Norton (1996b) also argue that BSC might function as the cornerstone for future success because, "*...combining the financial, customer, internal process and innovation, and organisational learning perspectives...helps managers understand ...many interrelationships. This understanding can help managers ...and ultimately lead to improved decision making and problem solving*" (Kaplan and Norton, 1992, p. 79). Kaplan and Norton (1993, 1996a) provide evidence that companies which use the multiple measurement system can operate in a more efficient way.

In a balanced scorecard, outcome measures are combined with measures that describe resources spent or activities performed (Olve *et al.*, 2000). Traditionally, management control put emphasis on decentralized profit goals which means that it is mostly focused on outcomes. However, by focusing solely on decentralized short-term profit, the management control will fail to present a large part of this fuller picture of an operation. Furthermore, Olve *et al.* (2000) argue that although profit is a good measure, it does not tell us enough about how an operation is managed. Good scorecards will combine out-

come measures, of which profit is only one, with performance drivers.

The BSC has been adopted by many companies and its format and content appear to meet several management needs (Butler et al., 1997; Lipe and Salterio, 2000). The scorecard guards against sub-optimization by forcing senior managers to consider all the important operational measures together. It alerts them to improvement in one area being achieved at the expense of another, or to an objective being badly met. The scorecard puts strategy and vision at the centre. Traditional measurement systems have a control bias, i.e. they specify the particular actions they want employees to take and then measure to see whether or not the employees have taken these actions—they try to control behaviour. The balanced scorecard, on the other hand, assumes that people will adopt whatever action is necessary to arrive at these goals. In summary, the scorecard is more than a performance measurement technique, it is a management system.

Although offering a sample template, adopted by all of their collaborating firms, Kaplan and Norton (1996) acknowledge that the BSC has to be tailored to each specific company. In particular, the resulting scorecard of indicators should be driven by the firm's strategy if it is not to consist merely of a listing of indicators. Individual firms have to be selective by linking explicitly their choice of indicators to their corporate strategy. A major task facing a company or division introducing a balanced scorecard is how to devise a set of measures explicitly linked to its strategy. Underlying this need is the essential condition that the strategy is widely understood and accepted within the organization, especially among those responsible for devising the scorecard itself.

There is a view that the BSC approach should help management to measure how divisions or strategic business units within the company to create value for current and future customers, how they relate to the internal structure and the investment in people, systems and procedures to improve the business drivers for future performance (Kaplan and

Norton, 1996, 2001; Atkinson et al., 1997; Ittner et al., 1997; Ittner and Larcker, 1998; Hoque and James, 2000; Malmi, 2001). However, several authors criticize the BSC philosophy. Butler et al., (1997) consider the BSC idea to be too general, often tends to ignore complex corporate culture. Norreklit (2000) strongly argues that BSC makes invalid assumptions, which may lead to the anticipation of performance indicators which are faulty.

Regardless the criticisms, some authors believe that BSC is indeed a powerful management tool. Otley (1999) comments that a major strength of the BSC approach is the emphasis it places on linking performance measures with business unit strategy. Although it has some weaknesses, the BSC is a potentially powerful tool by which senior managers can be encouraged to address the fundamental issue of effectively deploying an organisation's strategic intent. It focuses on establishing links between strategic objectives and performance measures. It also pays some attention to measuring the achievement of the components of the strategic plan the organization has promoted. Similar to Otley (1999), Malmi (2001) supports the use of BSC for improving organizational performance. In investigating the implementation of BSC in Finnish companies, Malmi (2001) finds that BSC have replaced traditional budgeting as a means for setting targets. Hence, it appears that in these companies the BSC extend the traditional profit responsibility to include other, non-financial measures as well. This in turn may indicate changes in accountability and ultimately changes in firm performance. In addition, Hoque and James (2000) empirically found that the use of BSC was associated with organizational effectiveness. Hence, it is expected that that the use of BSC is positively associated with performance.

The aforementioned literature review indicates that both TQM and BSC may affect organizational performance. As the purpose of this paper is to test the moderating and intervening model, the following hypotheses will be tested:

Ha1: There is an indirect effect of TQM on organizational performance via BSC.

Ha2: BSC moderates the relationship between TQM and organizational performance. For high BSC implementation, the effect of TQM on performance is more positive.

RESEARCH METHOD

To investigate the effects of BSC on the relationship between TQM and performance, this study employs a survey method using mail questionnaires. A survey using mail questionnaire approach is selected because of its flexibility, low cost, easiness to administer and lack of potential bias from interviewer-respondent interaction compared with personal and telephone interviews. However, the results of this study have to be interpreted with cautions due to the nature of studies based on mail questionnaires, which may be influenced by the respondents' understanding and interpretation to the questionnaire and the response rate problems.

In order to test the hypotheses, a path analytical technique using regression approach and moderated regression analysis are used to test the intervening/mediating model and moderating model, respectively. Path analysis is considered as an appropriate tool since this type of analysis can detect the direct and intervening effects (Duncan, 1966; Chenhall and Morris, 1986; Chong and Chong, 1997). Using path analysis, both the direct effects of TQM on performance and its indirect effects via BSC can be isolated from their total effects. In addition, all variables in this study were measured on an interval scale which satisfies the requirements of path analysis (Lau and Buckland, 2001). Moderated regression analysis is selected because the type of moderation effect of BSC on the relationship between TQM and performance will be tested is "form and monotonic interaction" (Hartmann and Moers, 1999).

Prior to hypotheses testing, factor analysis and reliability analysis are employed in this study. Factor analysis assists to check whether or not an empirical factor pattern or

structure is similar to the intended construct. Reliability analysis assists to assess the stability of a measure over a variety of conditions and the internal consistency of the scale. In this study, factor analysis is performed using the Principal Component Analysis (PCA) method and reliability is assessed by means of Cronbach alpha reliability coefficient.

Data and Sample

Data for this study were collected using a questionnaire survey sent to managers working in manufacturing organizations listed on the *Jakarta Stock Exchange*. The companies included in this study are those which have more than 100 employees in order to control the size of the organizations. In addition, as argued by Brownell and Dunk (1991), companies with less than 100 employees are not likely to have clearly defined areas of responsibilities and formal management control systems.

We only selected the manufacturing sector for the study because of the following reasons. First, manufacturing sector the largest sector (52%) in the *Jakarta Stock Exchange*. Second, the questionnaire used in this study is designed for manufacturing organizations. Third, it is very common in management accounting research to study a single sector, but involving a number of organizations. Listed companies were selected because almost all the largest and most advanced Indonesian companies were listed on the *Jakarta Stock Exchange*. In addition, it is very unlikely that small companies in Indonesia will implement TQM and BSC.

The respondents of this study were selected by making telephone calls to each of the companies to explain the purpose of the study and to ask the companies to supply the names of the managers appropriate to participate in the study. This method is aimed at ensuring the respondents understand the contents of the questionnaire, to receive the questionnaires, and also to ensure that it is the respondents themselves who answer the questionnaires. Amongst the targeted companies, one company has less than 100 employees. Hence, it was

excluded from the sample. One other company regarded itself as a service rather than a manufacturing organization. Hence, this company was also excluded from the sample. Thirty two companies informed the researcher that it was their policies not to disclose the name of their managers. Taking into account those companies' policies, 217 names of managers were obtained.

Survey Administration

A questionnaire together with a prepaid return addressed envelope and a covering letter explaining the objectives of the study was mailed to each of the 217 intended respondents. The questionnaires are marked to easily trace the targeted respondents who did not reply. A reminder letter was mailed three weeks after the mail date. Managers who did not respond to the questionnaire two weeks after the reminder letters sent out were contacted by phone. Out of the 217 questionnaires mailed, 66 responses (30.4%) were returned. Fourteen responses were excluded from the study because of the failure of the respondents to complete the whole questionnaire. As a result, there were 52 usable responses. Given that the survey was undertaken in Indonesia, such a response rate may be considered very high. Gudono and Mardiyah (2001) note that response rates in Indonesia generally range from 10% to 16%.

Variables and Their Measurements

Total Quality Management

To measure TQM practice, the instrument developed by Chenhall (1997) is used in this study. This instrument consists of seven items and focuses on material procurement programs (quality and reliability), production efficiency, improved cycle time, employee involvement in quality improvement programs, involvement of functional personnel in strategy formulation, development of contact between manufacturing and customers, and coordination of quality improvements within the organizations. Respondents were asked to indicate the extent to which the above programs are implemented using a seven-point

Likert-type scale, anchored on "no action" and "achieving outstanding performance, a leader in your industry, is a way of life with employees." Factor analysis shows that all the items loaded satisfactorily in a single factor accounting for 60% of the variance, and all items loading greater than 0.68. The factor loadings are presented in Table 1. The reliability check of the instruments in this study indicates a coefficient of 0.8762.

Table 1: Factor loading of TQM

Item	Factor
	1
TQM1	.817
TQM2	.813
TQM3	.714
TQM4	.805
TQM5	.758
TQM6	.680
TQM7	.818
Eigenvalue	4.194
Variance explained	59.907%
Cumulative variance explained	59.907%

Balanced Scorecard usage

This variable is measured using an instrument developed by Hoque et al. (1997) and subsequently used by Hoque and James (2000), Hoque et al. (2001), and Hoque (2005). The instrument consists of 20 items which cover the four perspectives of the BSC, three financial items and 17 nonfinancial items from three perspectives of customer, internal business process, and learning and growth perspective. It asks respondents to indicate the extent to which each item is used to assess the performance, using a seven point scale. Factor analysis is undertaken for all the 20 items. The three financial items loaded satisfactorily on a single factor. For the 17 nonfinancial items, the factor analysis results indicate that four items, do not load satisfactorily into their expected perspectives. Hence, they were excluded from further analyses. The factor loadings are presented in Table 2. The Cronbach alpha coefficient for the three financial items was 0.69. The Cronbach alpha coefficient for the remaining 13 nonfinancial items was 0.69.

Table 2: Factor loading of BSC

Item	Factor 1	Factor 2	Factor 3	Factor 4*	Factor 5
Operating income	.076	.058	.069	-.125	.863
Sales growth	.081	-.082	.718	-.010	.512
Return on investment	.177	-.095	.277	.495	.605
Manufacturing lead time	.276	.750	.001	.029	.198
Rate of material scrap loss	.177	.767	.095	.274	.068
Labor efficiency variance	.046	.814	.067	.177	-.204
Material efficiency variance	.504	.612	.151	.071	-.061
<i>Percent defective products shipped*</i>	.771	.374	.106	-.042	.047
Ratio of good output to total output	.367	.534	-.131	-.131	.482
<i>Number of new patents*</i>	-.083	.190	.163	.833	.105
Number of new product launches	.083	.267	.700	.304	.039
Time to market new products	.026	.283	.663	.515	.122
<i>Market share*</i>	.053	-.139	.799	.175	-.055
On-time delivery	.670	.256	.523	-.046	-.040
Number of customer complaint	.793	.223	.072	.062	.292
Survey of customer satisfaction	.455	.321	.392	-.001	.045
<i>Warranty repair cost*</i>	.353	.090	.192	.762	-.209
Customer response time	.482	.173	.195	.654	-.168
Cycle time from order to delivery	.792	.069	.073	.410	-.058
Percent shipments returned due to poor quality	.783	.047	-.136	.265	.241
Eigenvalue	6.975	2.686	2.067	1.625	1.252
Percentage of Variance explained	20.186	15.511	13.942	13.637	9.744
Cumulative Variance Explained (%)	20.186	35.697	49.638	63.276	73.019

*Items (and factor) are not used to test the hypotheses

Performance

This variable is measured using Swamidass and Newel (1987) which has also been used by Chenhall (1997). Respondents were asked to evaluate their organization’s performance compared to industry average on a seven-point Likert-Type scale, anchored on “below average performance” and “above average performance”. Factor analysis indicates that the items measure a single item of performance (Eigenvalue greater than 1 and total variance explained is 82.62). The factor loadings are presented in Table 3. A reliability check produce Alpha coefficient of 0.8896. For the hypotheses testing we use the overall

measure of each variable which is obtained by summing up the responses of each variable.

Table 3: Factor loading of Performance

Item	Factor 1
Performance 1	.904
Performance 2	.922
Performance 3	.901
Eigenvalue	2.479
Variance explained	82.625%
Cumulative variance explained	82.625%

RESULTS AND DISCUSION

This study investigates whether TQM is associated with performance and if so, whether such relationship is influenced by BSC. This study tests two models of the effect

of BSC on TQM-performance relationships. The first model is mediating/intervening model and the second model is moderating model. To test the mediating and moderating models, this study employs a path analysis using regression approach and moderated regression analysis, respectively. Cohen and Cohen (1983) suggest that to assess the adequacy of regression models, the residuals of the estimated values of the regression should be tested. Therefore, before testing the hypotheses, tests were performed to ensure that the inherent assumptions of the regression models were satisfied. Tests undertaken in this study included testing for the normality of residual, homogeneity of variance of residuals and the appropriateness of the linear models. The results of these tests indicate that the inherent assumptions of the models used were validated.

In addition, it is also important to conduct non-response bias test before analyzing the data as suggested by Oppenheim (1966). In conducting the test, the responses were divided into two groups based on their dates of arrival. The first half comprises the 50 percent of responses, which came in early, and the second half comprises the last 50 percent of responses received. These tests were performed by running t-tests to compare the mean of responses for each variable between the two groups. The results indicate that there are no significant differences between the early responses and the late responses for all the variables examined in this study.

Table 4 shows the zero-order correlations between the variables examined in this study. These results provide preliminary support for the hypotheses. TQM is positively associated with performance. Additionally, Table 4 also shows that BSC is positively and significantly associated with TQM. This fact suggests that multicollinearity may exist. In addition to the three inherent assumptions of regression models, therefore, the presence of multicollinearity was also assessed by performing variance inflation factor (VIF) tests for the regression model. Multicollinearity exists when *variance inflation factor* (VIF) value more than 10 (Hair et al., 1998). The results of multicollinearity test as presented in Table 5 indicate that multicollinearity among variables

was not detected. Therefore, no problem is detected with regard to the regression models used in this study.

Table 4: The zero-order correlations between the variables examined in this study

	BSC	Performance
TQM	0.507**	0.588**
BSC		0.666**

** p<0.01

Table 5: Multicollinearity detection with performance as dependent variable

Variable	Colinearity statistics	
	Tolerance	VIF
Constant	n/a	n/a
TQM	0.907	1.338
BSC usage	0.907	1.444

Hypotheses Testing

Intervening effects

The hypothesis states that there is an indirect effect of TQM on performance via BSC. As indicated in Table 4, there is a significant zero order correlation between TQM and performance. To ascertain if there is an indirect effect of TQM via BSC, further analysis is needed. The indirect effects of TQM on performance which is mediated by BSC usage is calculated as follows based on the values of the path coefficient in Table 6:

$$\text{TQM} - \text{BSC} - \text{P} = 0.358 \times 0.370 = 0.13246$$

The results show that the relationship between TQM and performance comprises two effects. First, there is a direct effect of 0.455 and second, there is an indirect effect of 0.133, which is mediated by BSC usage (see table 7). Since the indirect effect exceeds 0.05, the indirect effect can be considered meaningful (Bartol, 1983). Table 6, however, shows that after controlling the indirect effect of BSC, the direct effect of TQM on performance (0.358) is still significant (p<0.005). The results indicate that BSC usage *mediates partially* (Baron and Kenny, 1986) the relationship between TQM and performance. Thus, the hypothesis, which states that there is an indirect effect of TQM on performance through BSC, is supported. Table 7 provides a summary of the decomposition of the zero order correla-

tions between TQM and performance into direct effect and indirect effect.

Table 6: Path analysis results with multiple regression approach

Dependent Variable	Independent variable	Path coefficient	t-value	p-value
BSC usage	TQM	.358	2.715	.009
Performance	TQM	.455	4.063	.000
	BSC usage	.370	3.307	.002

Table 7: Decomposition of the observed correlations

Path Linkage	Observed Correlation	Direct effect	Indirect Effect
TQM- BSC	.358**	.358	
TQM- Performance	.588**	.455	0.133

Moderating effects

The hypothesis states BSC moderates the relationship between TQM and performance. For high BSC implementation, the effect of TQM on performance is more positive. To test the hypothesis, a hierarchical approach of moderated regression analysis with the following equation is run.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 x X_2 + \varepsilon,$$

where:

Y = Performance

X₁ = TQM

X₂ = BSC

X₁x X₂ = Interaction between TQM and BSC

To avoid potential computational problem, prior to fitting the equation to the data, the independent variables were centered (Hartmann and Moers, 1999) by converting the scores of independent variables into their deviation so that each variable has a mean of zero (Tabachnick and Fidell, 2001).

Table 8 Panel B presents the results of moderated regression analysis. From the table it can be seen that the interaction between TQM and BSC does not significantly affect performance (coefficient value of β₃ = -.826, p = 0.413). Hence, it can be concluded that BSC does not moderate the relationship between TQM and performance.

Table 8: The results of Moderated Regression Analysis with performance as dependent variable

Panel A.

Variable	Coefficient	Value	t	p
Intercept	β ₀	15.135	56.576	.000
TQM	β ₁	.337	2.960	.005
BSC	β ₂	.495	4.345	.000
F-value		27.372		.000
Adjusted R ₂		.508		

Panel B.

Variable	Coefficient	Value	t	p
Intercept	β ₀	15.227	52.343	.000
TQM	β ₁	.352	3.044	.004
BSC	β ₂	.494	4.324	.000
TQM x BSC	β ₃	-.083	-.826	.413
F-value		18.357		.000

The results of hypotheses testing show that BSC mediates the relationship between TQM and performance. However, BSC only *mediates partially* the relationship between TQM and performance. It means, in addition to the indirect effect of TQM via BSC, TQM itself has direct effect on performance. On the other hand, this study fails to support the moderating effect of BSC on the relationship between TQM and performance. A test of multiple regression analysis by excluding the interaction effect (Table 8 Panel A) reveals that both TQM and BSC positively affect performance. This is consistent with the results of mediating effect where TQM in itself has effect on performance. In addition, this also support Hoque and James (2000) who find that BSC positively affect performance.

CONCLUSION, LIMITATIONS, AND SUGGESTIONS FOR FUTURE RESEARCH

The purpose of this study is to test empirically whether TQM affects performance; and if so whether the effect is mediated and moderated by BSC implementation. In so doing, this study proposes two models of hypotheses: the mediating model hypothesis and the moderating model hypothesis. With mediating model hypothesis, this study hypothesizes that there is an indirect effect of TQM on performance via BSC. On the other hand, for moderating model hypothesis this study hypothesizes that BSC moderates the relationship between TQM and performance. For higher BSC implementation, the effect of TQM on performance will be more positive.

To test the mediating models hypothesis this study employs path analytical technique using regression approach. Furthermore, to test the moderating model hypothesis this study uses moderated regression analysis. The results of data analysis in this study suggest that there is an indirect effect of TQM on performance through BSC; hence, the finding supports the mediating model. On the other hand, the result of data analysis shows that

BSC does not moderate the relationship between TQM and performance. In the future, more studies should be conducted to elaborate the effect of TQM on performance and how BSC can have an intervening effect in the process. More research should also be conducted to reveal why BSC does not moderate the relationship between TQM and performance given that there is an indirect effect of TQM on performance through BSC. Furthermore, the moderating model and intervening model developed and tested in this study should be replicated fully to confirm the reliability and validity of those two models.

As other study, this study also has limitations. First, since this study uses mail survey method, the results of this study should be interpreted cautiously as survey method has its inherent limitations. Future study can study the same topic using other methods, i.e. case study approach or experimental design. Second, the conceptualization of BSC in this study is merely operationalized as a combination of financial and nonfinancial measures. As the measures in "true" BSC is linked to and derived from strategy, future study should also capture this dimension.

Apart from the aforementioned limitations, overall, this study may contribute to the discussion in the literature over whether TQM affects performance; and if so, whether the effect is influenced by BSC implementation. So far the discussions and, more importantly, empirical evidence have been quite limited. Therefore, this empirical study will hopefully lay the underpinning, and also encouragement, for more similar studies in the future.

REFERENCES

- Baron, R.M. and Kenny, D.A. (1986). "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic and Statistical Considerations". *Journal of Personality and Social Psychology*, 51(6), 1173-1182.

- Bartol, K.M. (1983). "Turnover among DP Personnel: A Causal Analysis". *Communications of the ACM*, 26 (10), 807-811.
- Bisbe, J., and Otley, D. (2004). "The Effects of the Interactive Use of Management Control Systems on Product Innovation". *Accounting, Organizations and Society*, 29, 709-737.
- Brownell, P. and Dunk, A.S. (1991). "Task Uncertainty and Its Interaction with Budgetary Participation and Budget Emphasis: Some Methodological Issues and Empirical Investigation". *Accounting, Organizations and Society*, 16 (8), 693-703.
- Butler, A., Letza, S. R. and Neale, B. (1997). "Linking the Balanced Scorecard to Strategy". *Long Range Planning*, 30 (2), 242-253.
- Chenhall, R.H. and Morris, D. (1986). "The Impact of Structure, Environment, and Interdependence on the Perceived Usefulness of Management Accounting Systems". *The Accounting Review*, 61 (1), 16-35.
- Chong, V. K. and Chong, K.M. (1997). "Strategic Choices, Environmental Uncertainty, and SBU Performance: A Note on the Intervening Role of Management Accounting Systems". *Accounting and Business Research*, 27 (4), 268-276.
- Chenhall, R.H. (1997). "Reliance on Manufacturing Performance Measures, Total Quality Management and Organizational Performance". *Management Accounting Research*, 8, 187-206.
- Chong, V. K., and Rundus, M. J. (2004). "Total Quality Management, Market Competition and Organizational Performance". *The British Accounting Review*, 36, 155-172.
- Cohen, J. and Cohen, P. (1983). *Applied Multiple Regression/Correlation analysis for the Behavioural Sciences*. 2nd edition. New Jersey: Lawrence Erlbaum Associates.
- Duncan, O.D. (1966). "Path Analysis: Sociological Examples". *American Journal of Sociology*, 72, 1-16.
- Epstein, M. and Manzoni, J. (1998). "Implementing Corporate Strategy: From Tableaux de Bord to Balanced Scorecards". *European Management Journal*, 16 (2), 190-203.
- Eriksson, H. and Hansson, J. (2003). "The Impact of TQM on Financial Performance". *Measuring Business Excellence*, 7 (1), 36-50.
- Fuchsberg, G. (1992). "Quality Programs Show Shoddy Results". *Wall Street Journal*, May 14, B1.
- Fuchsberg, G. (1993). "Small firms struggle with latest management trends – Designed to ease and improve, new techniques can confound and overwhelm". *Wall Street Journal*, August 26, B2.
- Govindarajan, V. and Gupta, A.K. (1985). "Linking Control Systems to Business Unit Strategy: Impact on Performance". *Accounting, Organizations and Society*, 10 (1), 51-66.
- Gudono and Mardiyah. (2001). "The Effects of Environmental Uncertainty and Decentralization on Management Accounting Systems Characteristics". *Jurnal Riset Akuntansi Indonesia*, 14 (1), 1 - 27.
- Hair, J. F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (1998). *Multivariate Data Analysis*. 5th ed. Upper Saddle River, NJ: Prentice Hall.
- Hendricks, K.B. and Singhal, V.R. (2001). "Firm Characteristics, Total Quality Management and Firm Performance". *Journal of Operations Management*, 19 (3), 269-285.
- Hill, R.C. (1993). "When the Going Gets Rough: A Baldrige Award Winner on

- the Line". *The Academy of Management Executive*, 7 (3), 75-79.
- Hoque, Z. and Alam, M. (1989). "TQM Adoption, Institutionalism and Changes in Management Accounting Systems: A Case Study". *Accounting and Business Research*, 29 (3), 199-210.
- _____; Mia, L. and Alam, M. (1997). "Competition, New Manufacturing Practice, Changing in MAS and Managerial Choice of the "Balanced Scorecard" Approach to Performance Measures: an Empirical Investigation". *Paper Presented at the 1997 European Accounting Association Annual Congress in Graz*.
- _____; and James, W. (2000). "Linking Balanced Scorecard Measures to Size and Market Factors: Impact on Organizational Performance". *Journal of Management Accounting Research*, 12, 1-17.
- _____; Mia, L. and Alam, M. (2001). "Market Competition, Computer-Aided Manufacturing and Use of Multiple Performance Measures: An Empirical Study". *British Accounting Review*, 33, 23 – 45.
- _____. (2003). "Total Quality Management and the Balanced Scorecard Approach: A Critical Analysis of Their Potential Relationships and Direction for Research". *Critical Perspective on Accounting*, 14, 553-566.
- Ittner, C.D. and Larcker, D.F. (1995). "Total Quality Management and the Choice of Information and Reward Systems". *Journal of Accounting Research*, 33, 1-34.
- Ittner, C. D. and Larcker, D. F. (1997). "Quality Strategy, Strategic Control Systems, and Organizational Performance". *Accounting, Organizations and Society*, 22 (3/4), 293-314.
- Ittner, C.D., Larcker, D.F., and Rajan, M.V. (1997). "The Choice of Performance Measures in Annual Bonus Contracts". *The Accounting Review*, 72 (2), 231-255.
- Ittner, C. D. and Larcker, D. F. (1998). "Innovations in Performance Measurement: Trends and Research Implications". *Journal of Management Accounting Research*, 10, 205-238.
- Kaplan, R.S. and Norton, D.P. (1996a). *The Balanced Scorecard: Translating Strategy into Action*. Boston, MA: Harvard Business School Publishing.
- Kaplan, R. S. and Norton, D. P. (1996b). "Linking the Balanced Scorecard to Strategy". *California Management Review*, 39, 1, 53-79.
- Kaplan, R.S. and Norton, D.P. (2001). "Transforming the Balanced scorecard from Performance Measurement to Strategic Management: Part 1". *Accounting Horizons*, 15 (1), 87-104.
- Kaynak, H. (2003). "The Relationship between total Quality Management Practices and their Effects on Firm Performance". *Journal of Operations Management*, 21, 405-435.
- Lau, C. M. and Buckland, C. (2001). "Budgeting-Role of Trust and Participation: research Note". *Abacus*, 37 (3), 369-388.
- Langfield-Smith, K. (1997). "Management Control Systems and Strategy: A Critical Review". *Accounting, Organizations, and Society*, 22 (2), 207-232.
- Lipe, M.G. and Salterio, S.E. (2000). "The balanced scorecard: Judgmental effects of Common and Unique Performance Measures". *The Accounting Review*, 75 (3), 283-298.
- Malmi, T. (2000). "Balanced Scorecard in Finnish Companies: A Research Note". *Management Accounting Research*, 12, 207-220.
- Mathews, J. and Katel, P. (1992). The Cost of Quality. *Newsweek*, 120 (10).

- Morgan, C. and Murgatroyd, S. (1994). *Total Quality Management in the Public Sector: An International Perspective*. Buckingham, Philadelphia: Open University Press.
- Norreklit, H. The Balance on the Balanced Scorecard – A Critical Analysis of Some of Its Assumptions. *Management Accounting Research*, 11, 65-88.
- Oakland, J. S. (1993). *Total Quality Management: The Route to Improving Performance*. Jordan Hill, Oxford: Butterworth-Heinemann.
- Olve, N., Roy, J., and Wetter, M. (2000). *Performance Drivers: A Practical Guide to Using the Balanced Scorecard*. Chichester, West Sussex: John Wiley & Sons, Ltd.
- Oppenheim, A.N. (1966). *Questionnaire Design and Attitude Measurement*. London: Heinemann.
- Otley, D. (1999). “Performance Management: A framework for Management Control Systems Research”. *Management Accounting Research*, 10, 363-382.
- Powell, T.C. (1995). “Total Quality Management as Competitive Advantage: A Review and Empirical Study”. *Strategic Management Journal*, 16 (1), 15-37.
- Prajogo, D.I. and Brown, A. (2004). “The Relationship between TQM Practices and Quality Performance and the Role of Formal TQM Programs: An Australian Empirical Study”. *The Quality Management Journal*, 11(4), 31-42.
- Ross, J. (1994). *Total Quality Management: Text, Cases, and Readings*. 2nd ed. London: Kogan Page.
- Sim, K.L. and Killough, L.N. (1998). “The Performance Effects of Complementarities between Manufacturing Practices and Management Accounting systems”. *Journal of Management Accounting Research*, 10, 325-346.
- Simons, R. (1987). “Accounting Control System and Business Strategy: An Empirical Analysis”. *Accounting, Organization and Society*, 12 (4): 357-374.
- Swamidass, P.M. and Newell, W.T. (1987). “Manufacturing Strategy, Environmental Uncertainty and Performance: A Path Analytic Model”. *Management Science*, April, 509 – 524.
- Walton, M. (1986). *The Deming Management Method*. London: Mercury.
- Whittington, R. (1993). *What is Strategy – and Does It Matter?* London: Routledge.
- Wilkinson, A., Peter, A., and Snape, E. (1992). “TQM and the Management of Labour”. *Management Decision* 30 (6), 116-123.
- Yamin, S. and Gunasekaran A. (1999). “Organisational quality – a Cognitive Approach to Quality Management”. *The TQM Magazine*, 11(3), 180-187.