

MULTIPLE PERFORMANCE MEASURES USAGE AMONG THE BALANCED SCORECARD ADOPTERS AND NON-ADOPTERS: THE MALAYSIAN EXPERIENCE

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ABSTRACT

The main purpose of this paper is to provide empirical evidence on whether there is a significant difference between the extent of use of multiple performance measures between the balanced scorecard (BSC) adopters and non-adopters. The results of the survey show that, despite the popularity of BSC as a performance measurement and management tool, its adoption is still low in Malaysia. This paper reports that Malaysian manufacturers still use traditional financial measures to a large extent. Also, there are significant differences in the use of multiple performance measures relating to financial, customer, and internal processes such as operating income, return-on-investment (ROI), cash flows, number of customer complaints, and manufacturing lead time between BSC adopters and non-adopters. However, there is no significant difference in the use of performance measures relating to internal processes and innovation measures. Surprisingly, the results also reveal that there is no significant difference in performance between the firms in the two groups. Concerning firm size, the size of BSC adopters is found to be larger than the non-adopters.

JEL Classification numbers: M41

Keywords: Balanced scorecard, Multiple performance measures, Performance measurement

1. INTRODUCTION

With the growing discontent over the traditional management accounting and performance measurement systems (PMSs) and the increasing importance of multidimensional performance measures, many organizations worldwide have either implemented a new performance measurement system or modified their existing performance measurement system to meet the needs of today's business environment. Essentially, traditional performance measurement systems measure the performance of a business using financial accounting-based measures with short-term and backward-looking focus. Hence, traditional PMSs seem to ignore the non-financial performance measures, which are important to measure the long-term value creation activities created from intangible assets. Managing and measuring long-term value creation activities are essential to any business organization as they can generate future growth for the organization.

Because of the growing need to improve planning, control, and performance measurement systems, Kaplan and Norton introduced the BSC in the early 1990s. The BSC is a powerful

tool for performance measurement and strategy execution, and, worldwide, has gained acceptance by many organizations today. A survey found that 50% of the Fortune 1,000 companies in North America and 40–45% of larger companies in Europe use the BSC (Brewer, 2002). Even though much has been written in the literature regarding the benefits of the BSC, few empirical studies have been conducted to establish the relationship between performance improvement and the adoption of the BSC.

To date, little research has been published on performance measurement systems in the Malaysian context. There is not much information on the extent to which Malaysian organizations actually use performance measurement, particularly the BSC. In particular, there is still not much empirical evidence on whether an improvement in financial and non-financial performance will occur after implementing the BSC. Hence, the objectives of this study are to:

- (1) Examine the adoption level of the BSC by Malaysian manufacturing firms;
- (2) Determine whether there is a significant difference in the extent of use of performance measures between adopters and non-adopters of the BSC;
- (3) Determine whether there is a significant difference in firm performance between adopters and non-adopters of the BSC; and
- (4) Determine whether there is a significant difference in firm size between adopters and non-adopters of the BSC.

This paper is divided into four sections. The first section presents a brief literature review on the importance of multi-dimensional performance measures and the balanced scorecard framework, which in turn leads to the hypotheses development. This is followed by the methodology section explaining the sample and variable measurements. The third section provides the results of the survey. Finally, a section on the discussion of the findings is presented together with a conclusion.

2. LITERATURE REVIEW

2.1 Multi-dimensional Performance Measures

Financial measures are described as “lagging” measures as they focus on the past rather than future performance. They are unable to indicate to managers what must be done to improve future performance. Therefore, managers need a range of operational and leading measures that can drive performance throughout the organization. The integration of both financial and non-financial performance measures has been incorporated into the balanced scorecard framework proposed by Kaplan and Norton (1992, 1996). Inclusion of non-financial measures is actually an effort to reduce managerial bias towards financial measures in performance evaluation (Kaplan and Norton, 1992). The integrated performance measurement systems as proposed by Dixon *et al.* (1990) and Nanni *et al.* (1992), for example, places greater emphasis on non-financial measures, particularly those relating to customers and internal processes.

The BSC framework focuses on four different perspectives of performance measures covering financial, customer, internal process, and learning and growth. According to Kaplan and Norton (2001), these four perspectives are linked together in a cause-and-effect relationship

and help to translate strategy into objectives and measures. The cause-and-effect relationship in strategy maps demonstrates how the intangible assets are transformed into tangible (financial) outcomes. The BSC not only translates the strategy to operational terms, but also aligns the organization to the strategy. The BSC plays its role as a measurement system as well as a management system. According to Gumbus and Lyons (2002), for example, the BSC has evolved from management reporting to a strategic tool used by managers to set strategy, align operations, and communicate with internal and external stakeholders. As a strategic tool, a question arises as to whether or not managers need some kind of weighting mechanism by which to prioritize their daily actions, since it is unlikely that all measures are equally important for driving strategy all of the time (Reisinger *et al.*, 2003).

Several studies have been conducted previously investigating how managers weigh and judge the performance measures they use (Banker, Chang, and Pizzini, 2004; DeBush, Brown, and Killough, 2003; Dilla and Steinbart, 2005; Ittner, Larcker, and Meyer, 2003; Lipe and Salterio, 2000; Rich, 2007). Lipe and Salterio (2000), for example, found that common measures (financial or lagging measures) have more effect on the decisions of unit managers than the unique measures (non-financial or leading measures) in performance evaluations. Later, Dilla and Steinbart (2005) found similar results, but showed a relatively greater emphasis on unique measures after using the BSC for some time. Meanwhile, Banker *et al.* (2004) found that irrespective of whether measures are common or unique, managers rely more on strategically linked measures when available, even if they are unique, rather than on non-linked measures that are common. Further, a recent experimental study by Rich (2007) suggests that managers do not rate the importance of individual performance measures equally and at the outset of the decision process they often rely on simplifying strategies to help process the information in the time available.

According to Marr (2005), BSC is the most popular business performance measurement (BPM) approach today. He found that companies with a formal BPM approach placed more emphasis on their non-financial measures, where only 5% stated that more than three-quarters of their measures are financial and only 21% reported that more than half of their measures are financial ones. In contrast, in companies without a formal BPM approach, 31 per cent said that over three-quarters of their measures are financial and 64 per cent said that over half of their measures are financial ones.

Despite suggestions that firms should emphasize and give more weight to non-financial measures, Gosselin (2005) reported that financial measures are more frequently used by manufacturing firms in the sample of his study. Therefore, we may expect similar results in the Malaysian manufacturing industries and the following hypothesis was set forth:

H1: Firms tend to use financial measures more extensively than non-financial measures.

Consistent with Marr's (2005) study and considering that the comprehensive performance measures of the BSC are predominantly non-financial in nature, we may expect that the extent to which firms use non-financial measures will be higher in firms adopting the BSC than non-adopting firms. Therefore, this hypothesis was developed:

H2: Firms that have adopted the BSC use non-financial measures more extensively and financial measures less extensively than firms that have not adopted the BSC.

2.2 Performance Measures and Performance

Kaplan and Norton (1992, p. 78) stated that “a failure to convert operational performance, as measures in the scorecard, into improved financial performance, should send executives back to their drawing boards to rethink the company’s strategy or its implementation plans.” This suggests that the performance of a firm will increase with the use of the BSC. Moreover, Kaplan and Norton (2001) indicated that measuring customer, operational efficiency and learning and growth all contribute to the bottom line.

Marr (2005), in his survey on business performance measurement use in the USA, found that organizations that follow a formal business performance measurement methodology, such as BSC, to manage their corporate performance outperform the organizations without a formal methodology to manage corporate performance. He also found that there is a positive impact of business performance measurement on communication effectiveness, collaboration, and the extraction of valuable insights and decisions.

Furthermore, several companies in the profit and non-profit industries have reported improved performance in operational efficiency and profitability as a result of using the BSC (e. g. Green, Garrity, Gumbus, and Lyons, 2002; and Ahn, 2001). Similarly, Daly (1996, pg. 65) noted that “preliminary evidence from field research indicates that analysts who focused on non-financial issues have increased accuracy in their earning estimates and a strong correlation with growth expectations.” Since the comprehensive performance measures of the BSC are predominantly non-financial in nature, Daly’s findings support the argument that the BSC can be used to increase performance. In a similar vein, Caterpillar has proved that corporate restructuring and developing a new performance measurement system focusing on financial and non-financial performance measures has encouraged the employees to make better decisions, improved customer services and productivity and in turn impacted Caterpillar’s results favourably (Hendricks *et al.*, 1996).

The empirical studies conducted by Hoque and James (2000), Malina and Selto (2001), Ittner *et al.* (2003), and Davis and Albright (2004) also examined the association between BSC usage and organizational performance. Hoque and James (2000) found that there is a significant positive relationship between the usage of BSC measures and performance among the Australian manufacturing firms. Malina and Selto (2001) conducted an intensive field study of a large manufacturing organization and found that perceived improved performance on the BSC would lead to improved efficiency and profitability. More recently, Davis and Albright (2004) investigated the implementation of the BSC in a banking institution and provided evidence that it can be used to improve financial performance. Their findings indicate that branches in the BSC group outperformed non-BSC branches on a common composite financial measure.

Meanwhile, a study by Banker *et al.* (2000) in a hotel chain has shown that there is a positive relationship between the use of non-financial measures (for example customer satisfaction) and financial performance. This study provides evidence that the implementation of a performance measurement system that includes non-financial measures, such as the BSC, can be associated with improved financial performance.

However, contradictory evidence to the above mentioned studies was provided by Ittner *et al.* (2003). Ittner and his friends studied financial service industry and found that there is a negative relationship between BSC usage and financial performance (ROA).

Following suggestions by Kaplan and Norton and findings from several previously mentioned studies, it is expected that firms that have adopted a BSC outperform the firms that have not adopted a BSC. Thus the following hypothesis was developed:

H3: Firms that have adopted the BSC outperform the firms without the BSC.

2.3 Firm Size and the Adoption of BSC

Organization size can have an effect on the design of accounting systems and on budget characteristics (Merchant, 1981). Merchant (1981) noted that larger firms which are more diverse and decentralized tend to implement a more administratively-oriented control strategy and greater budgeting sophistication. In relation to the BSC, Hoque and James (2000) found that large size is positively associated with the overall usage of BSC measures. However, later, a study by Hoque, *et al.* (2001) indicates that business unit size does not appear to be an important predictor of usage of a performance measurement system (BSC). More recently, Speckbacher *et al.* (2003) studied the impact of size on BSC and found that there is a significant association between size and BSC usage.

Blau and McKinley (1979) found that innovation was positively correlated with size. Since the BSC is considered as an important innovation in performance measurement and management systems, it is expected that BSC adopters tend to be large firms. However, there is a need for BSC to be used by small and medium enterprises (SMEs) as well (Chow, Haddad, and Williamson, 1997; Gumbus and Lussier, 2006).

It is expected that firm size will differ between adopters and non-adopters of BSC where BSC tends to be adopted by larger firms rather than the smaller ones. An argument for this proposition is that larger firms are usually associated with more access to resources, economies of scale, and value chain alliances (Kettinger *et al.*, 1994), thus its requirement for information in general and performance measures in particular will increase. Whereas, many smaller companies do not often have sufficient resources in terms of experienced staff and budget to develop the BSC.

Hence, from the foregoing arguments, the following hypothesis was suggested:

H4: Firms that have adopted the BSC tend to be larger than firms that have not adopted the BSC.

3. RESEARCH METHODS

The Sample

The population surveyed consists of Malaysian manufacturing firms listed in the Federation of Malaysian Manufacturers (FMM) directory, year 2003. A sample of 975 firms was randomly drawn from this list. Data was collected using a mailed-questionnaire survey. The questionnaire was directed to CEOs and managing directors where their names were extracted from the directory. One hundred and twenty of the mailed questionnaires were completed and returned, yielding a response rate of 12.3 per cent.

Measurement of Variables

Multiple performance measures usage. The questionnaire includes a list of 29 performance measures comprising financial and non-financial measures commonly used by manufacturing

organizations. Twenty items were taken from Hoque *et al.* (2001), which were originally adopted from Kaplan and Norton (1992). The remaining nine items were taken from various academic literature. The extent of use of each performance measure was assessed on a seven-point Likert scale ranging from not at all (1) to a greater extent (7). The assumption was made that all firms use some kind of indicators to measure aspects of their performance and that these measures were operationalized according to the BSC framework. A list of the performance measures (before factor analysis) used by all responding firms is presented in Table 1. The 29 performance measures were ranked according to the mean score of the extent to which firms use each of the performance measures.

Performance. Performance of the firm was assessed using a multiple indicator approach incorporating both financial and non-financial performance. The respondents were required to indicate recent improvements in *actual* firm performance for these 12 indicators: productivity, cost, quality, delivery schedule, market share, sales growth rate, operating profit, cash flow from operation, return on investment, new product development, R&D activity, and personnel development (Mia and Clarke, 1999; Govindarajan, 1984).

Size. Size of firm was measured by the number of employees as obtained from the FMM directory. Number of employees is one of the more common methods of measuring organizational size (Smith, *et al.*, 1989). Firm size was measured as the log of total number of employees (Carpenter & Fredrickson, 2001).

4. RESULTS

4.1 Profiles of Responding Firms

The majority of the firms come from four types of manufacturing activities. They are electrical and electronics product manufacturing (25); followed by iron, steel, and metal product manufacturing (18); food and beverage manufacturing (13); and rubber and plastic product manufacturing (11). The responding firms range from small and medium (29% of the sample firms have employees less than or equal to 150) to large (71% of the firms have employees greater than 150). In Malaysia, manufacturing firms with full-time employees not exceeding 150 are considered as small and medium enterprises (SMEs) as defined by Small and Medium Industries Development Corporation (SMIDEC). The firms with annual sales turnover greater than or equal to RM21 million is 82.3%. The majority of the firms have total gross assets of less than or equal to RM50 million (52.6%), while those with total gross assets above RM150 million is 18.4%.

4.2 BSC Adoption

In the questionnaire, respondents had to indicate whether or not their firms had adopted the BSC. As shown in Table 1, about 30.4% of the firms have adopted the balanced scorecard as a performance measurement system either wholly (8.7%) or partially (21.7%). Of those that have not adopted BSC, 31.3% said that their firms intend to adopt it in the future while 12.2% said that their firms do not have any intention to do so. There were five firms that did not respond to this question. Surprisingly, quite a number of firms (26.1%) did not adopt BSC because they are not aware of its value. The findings indicate that the adoption rate of BSC in

Malaysia is lower than in the USA (44% found by Rigby, 2001 and 35% found by Marr, 2005), India (45% reported by Anand, Sahay, and Saha, 2005), and Australia (88% found by Chenhall and Smith, 1998). However, the adoption rate is much higher than in Germany, Switzerland, Austria (26% as reported by Speckbacher *et al.*, 2003), and Finland (22.5% as found by Malmi, 2001), while a similar rate was found in Canadian Manufacturing firms (Gosselin, 2005).

Table 1
BSC Adopters and Non-Adopters

	<i>Frequency</i>	<i>Valid Per cent</i>
Adoption of BSC:		
Yes, partially	25	21.7
Yes, wholly	10	8.7
No, but intend to use it in the future	36	31.3
No, and do not intend to use it in the future	14	12.2
Do not know	30	26.1
Total	115	

4.3 Extent of Use of Performance Measures

As shown in Table 2, from the top six performance measures, five of them are financial. These measures are: sales revenue, operating income, sales growth, manufacturing costs, and cash flow. Except for on-time delivery, which is ranked first, all the other non-financial measures are ranked seventh and below. These results indicate clearly that financial measures are still important and receive more weight in the performance measurement systems of Malaysian manufacturing firms despite extensive literature favouring the use of non-financial measures. Therefore, overall, the results provide reasonable support for *H1*.

Table 2
Performance Measures

	<i>Mean</i>	<i>Standard Deviation</i>
On-time delivery	5.9916	.9957
Sales Revenue	5.9833	.9165
Operating income	5.9832	1.0575
Sales growth	5.9583	.8925
Manufacturing costs	5.8167	1.1226
Cash flow	5.7203	1.2187
Customer response time	5.6639	1.0991
Number of customer complaints	5.6186	1.5901
Survey of customer satisfaction	5.5250	1.1447
Manufacturing lead time/cycle time	5.5085	1.3381
Defect rate	5.5043	1.6275
Employee training	5.4833	1.1226
Market share	5.4746	1.2034
Ratio of good output to total output	5.4576	1.3815
ROI	5.4250	1.1858
Materials efficiency variance	5.3898	1.5137
Labour efficiency variance	5.3729	1.3700
Customer loyalty	5.3667	1.4019

table 2 contd.

	<i>Mean</i>	<i>Standard Deviation</i>
Rate of material scrap loss	5.3559	1.6147
Employee satisfaction	5.0167	1.4022
Setup and changeover time	4.9915	1.4354
Number of overdue deliveries	4.9912	1.6590
EVA (Economic value-added)	4.9492	1.4313
% of shipments returned	4.8750	1.9210
Flexibility	4.8448	1.4542
Number of warranty claims	4.6639	1.9799
Number of new product launches	4.2288	1.8277
Time-to-market new products	4.1849	1.7465
Number of new patents	3.5462	1.8354

4.4 BSC Adopters Vs Non-adopters

To test *H2*, an analysis of the means of each 29 performance measures was performed. The responding firms were divided into two groups: adopters and non-adopters of the BSC. For the purpose of the analysis, 35 firms that adopted BSC either wholly or partly are considered as adopters, while 80 firms are considered as non-adopters. Descriptive statistics for these two groups are presented in Table 3 and Table 4.

Table 3
Descriptive Statistics – BSC Adopters

	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
Operating income	34	2.00	7.00	6.3235	1.03633
Sales Revenue	35	4.00	7.00	6.1714	.92309
On-time delivery	34	2.00	7.00	6.1471	1.10460
sales growth	35	4.00	7.00	6.1429	.91210
Cash flows	33	2.00	7.00	6.1212	1.16613
Manufacturing costs	35	2.00	7.00	6.1143	1.13167
Number of customer complaints	34	2.00	7.00	6.0000	1.34840
Manufacturing lead time/cycle time	34	2.00	7.00	5.8824	1.45153
Survey of customer satisfaction	35	4.00	7.00	5.8571	.94380
Materials efficiency variance	34	2.00	7.00	5.8529	1.32876
Customer response time	34	4.00	7.00	5.8529	.95766
Rate of material scrap loss	34	2.00	7.00	5.8235	1.42426
ROI	35	3.00	7.00	5.8000	1.05161
Defect rate	34	2.00	7.00	5.7941	1.51316
Labour efficiency variance	34	2.00	7.00	5.7059	1.38234
Employee training	35	4.00	7.00	5.6286	.91026
Ratio of good output to total output	34	1.00	7.00	5.5588	1.61791
% of shipments returned	35	2.00	7.00	5.5143	1.35845
Market share	34	2.00	7.00	5.4706	1.30814
Number of overdue deliveries	32	3.00	7.00	5.4375	1.29359
Employee satisfaction	35	1.00	7.00	5.3143	1.30094
EVA (Economic value- added)	34	2.00	7.00	5.2941	1.40409
Number of warranty claims	35	2.00	7.00	5.2857	1.65514
Customer loyalty	35	1.00	7.00	5.2857	1.58247
Setup and changeover time	34	1.00	7.00	5.2353	1.65252
Flexibility	34	1.00	7.00	4.9412	1.55585
Time-to-market new products	35	1.00	7.00	4.2286	1.81636
Number of new product launches	35	1.00	7.00	4.2286	1.80009
Number of new patents	35	1.00	7.00	3.8571	1.66527
Valid N (listwise)	29				

Table 4
Descriptive Statistics – BSC NON-Adopters

	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
Sales Revenue	80	3.00	7.00	5.9125	.93041
On-time delivery	80	3.00	7.00	5.9000	.94935
Sales growth	80	4.00	7.00	5.8750	.87692
Operating income	80	4.00	7.00	5.8250	1.05272
Manufacturing costs	80	3.00	7.00	5.7125	1.08142
Cash flows	80	2.00	7.00	5.5750	1.23016
Customer response time	80	2.00	7.00	5.5500	1.15726
Number of customer complaints	79	2.00	7.00	5.5063	1.62412
Market share	79	1.00	7.00	5.4684	1.17490
Ratio of good output to total output	79	2.00	7.00	5.4177	1.30686
Survey of customer satisfaction	80	2.00	7.00	5.4125	1.16591
Defect rate	78	2.00	7.00	5.4103	1.63116
Employee training	80	2.00	7.00	5.4000	1.21801
Customer loyalty	80	1.00	7.00	5.3875	1.34535
Manufacturing lead time/cycle time	79	2.00	7.00	5.3671	1.26265
Materials efficiency variance	79	1.00	7.00	5.2785	1.50159
Labour efficiency variance	79	1.00	7.00	5.2785	1.32951
Rate of material scrap loss	79	2.00	7.00	5.2532	1.58088
ROI	80	2.00	7.00	5.2500	1.23760
Setup and changeover time	78	1.00	7.00	4.9231	1.31692
Number of overdue deliveries	78	1.00	7.00	4.8974	1.71009
Employee satisfaction	80	1.00	7.00	4.8500	1.44169
Flexibility	77	1.00	7.00	4.7792	1.42924
EVA (Economic value-added)	79	1.00	7.00	4.7722	1.45839
% of shipments returned	80	1.00	7.00	4.7250	2.01246
Number of warranty claims	79	1.00	7.00	4.4937	2.01834
Number of new product launches	78	1.00	7.00	4.2308	1.85110
Time-to-market new products	79	1.00	7.00	4.1519	1.73271
Number of new patents	79	1.00	7.00	3.3797	1.87633
Valid N (listwise)	68				

Table 5 presents the results of the comparison of the group means using the independent sample T-test. As shown in Table 5, only 11 performance measures were significantly different between adopters and non-adopters of BSC. Six of the measures are typically financial. They are operating income, ROI, cash flows, manufacturing costs, EVA, and materials efficiency variance. The remaining five measures that are essentially non-financial are commonly used to measure customer (number of warranty claims, survey of customer satisfaction, and percentage of shipments returned) and internal processes (manufacturing lead time/cycle time and rate of material scrap loss). The six financial measures that were significant represent about 67% of the total nine financial measures, while the five non-financial measures that were significant represent only 25% of the total 20 non-financial measures. Thus, the results from Table 5 cannot confirm that the BSC adopters use non-financial measures to a larger extent and use financial measures to a lesser extent compared to the non-adopters. Instead, the results show that both financial and non-financial measures are used to a larger extent by the BSC adopters than by the non-adopters.

Table 5
Performance Measures–T-Test for Group Means Comparison

<i>Performance Measures</i>	<i>Mean</i>		<i>p-value</i>
	<i>Adopters</i>	<i>Non-adopters</i>	
Operating income	6.3235	5.8250	0.022
ROI	6.1429	5.8750	0.024
Cash flows	6.1212	5.5750	0.030
Manufacturing costs	6.1143	5.7125	0.073
EVA	5.2941	4.7722	0.080
Number of warranty claims	5.2857	4.4937	0.031
Survey of customer satisfaction	5.8571	5.4125	0.034
% of shipments returned	5.5143	4.7250	0.016
Materials efficiency variance	5.8529	5.2785	0.056
Manufacturing lead time/cycle time	5.8824	5.3671	0.060
Rate of material scrap loss	5.8235	5.2532	0.073

Note: The table includes only the measures for which there was a significant difference in the means

In order to perform a further test, all 29 performance measures were divided into two classifications, representing financial measures and non-financial measures. The classifications are as shown in Table 6. An independent sample T-test was performed to compare the mean scores on financial and non-financial measures between the adopters and non-adopters of BSC. Table 7 illustrates the results. There is a significant difference in financial measures for adopters (mean = 5.9494) and non-adopters (mean = 5.5003). There is also a significant difference in non-financial measures for adopters (mean = 5.3594) and non-adopters (mean = 5.0300). Now, the results of this test confirm that the BSC adopters use both non-financial and financial measures to a larger extent compared to the non-adopters. These results are consistent with the results presented in Table 5.

Table 6
Financial VS Nonfinancial Measures

<i>Financial Measures</i>	<i>Nonfinancial Measures</i>
Sales Revenue	On-time delivery
Operating income	Customer response time
Sales growth	Number of customer complaints
Manufacturing costs	Survey of customer satisfaction
ROI	Manufacturing lead time/cycle time
Materials efficiency variance	Defect rate
Labour efficiency variance	Employee training
Cash flows	Market share
EVA	Ratio of good output to total output
	Customer loyalty
	Number of overdue deliveries
	Rate of material scrap loss
	Employee satisfaction
	Setup and changeover time
	% of shipments returned
	Flexibility
	Number of warranty claims
	Number of new product launches
	Time-to-market new products
	Number of new patents

Table 7
Financial and Non-Financial Measures-T-Test for Group Means Comparison

	<i>Mean</i>		<i>p-value</i>
	<i>Adopters</i>	<i>Non-adopters</i>	
Financial Measures	5.9494	5.5003	0.004
Nonfinancial Measures	5.3594	5.0300	0.068

To test *H3*, an analysis of the means of each performance indicator was performed for both adopters and non-adopters of BSC. However, the results reveal that there is no significant difference for each of the 12 performance indicators between the BSC adopters and non-adopters. Thus, *H3* was not supported. The results of this test are purposely not reported in this paper.

To test *H4*, a comparison of group means of number of employees was carried out. Table 8 provides the results. Firm size was measured using number of employees obtained from the FMM directory. Firm size was then transformed logarithmically to adjust for expected non-linearity or non-normality (Gosselin, 1997). The results indicate that the firm size of BSC adopters and non-adopters is significantly different. Number of employees score for the adopters (mean = 5.7144) is significantly higher than the non-adopters (mean = 5.3309). Hence, *H4* was supported.

Table 8
Firm Size-T-Test for Group Means Comparison

	<i>Mean</i>		<i>p-value</i>
	<i>Adopters</i>	<i>Non-adopters</i>	
Number of employees	540.4194 (5.7144)*	303.0921 (5.3309)*	0.046

* Values in brackets are when number of employees measuring firm size was transformed logarithmically.

Additional Analysis

In this section, to further explore whether the use of multiple performance measures can be grouped into the four dimensions of BSC suggested by Kaplan and Norton (1992, 1996), the 29 performance measures were factorized with varimax. Factor analysis is necessary since this study was exploratory in nature. After several runs of factor analysis only 17 measures were eventually left and a total of 12 items were deleted from the analysis due to cross-loadings and insignificant factor loadings. This procedure finally identified five factors with Eigenvalues greater than 1 that explained a total of 71.9% of the variance. Table 9 presents the factor loading for each of the performance measures. The first factor was labelled *product-focused customer*. It consists of four measures related to percentage of shipments returned, number of overdue deliveries, number of warranty claims, and number of customer complaints. The second factor includes four measures pertaining to manufacturing lead time or cycle time, ratio of good output to total output, labour efficiency variance, and flexibility. Thus, it was named *internal processes*. The third factor was labelled *innovation* as it is composed of three measures relating to time-to-market new products, number of new product launches, and number of new patents. Factor 4 is made up of a group of measures that are typically financial, thus was named *financial*. There are three measures under this factor: sales revenue, sales growth, and operating

income. Factor 5 is a group of measures relating to on-time delivery, customer response time, and survey of customer satisfaction. Thus, this factor was labelled *time-focused customer*.

Table 9
Factor Loadings

<i>Performance Measures</i>	<i>Factors</i>				
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
% of shipments returned	.840	.210	.041	.125	.067
Number of overdue deliveries	.839	.110	.066	.154	.183
Number of warranty claims	.817	.059	.241	-.100	.086
Number of customer complaints	.777	.278	-.043	.167	.219
Manufacturing lead time/cycle time	.171	.836	.101	.118	.146
Ratio of good output to total output	.042	.830	.083	.096	.202
Labour efficiency variance	.314	.659	.164	.198	.176
Flexibility	.244	.540	.324	-.042	.176
Time-to-market new products	.012	.186	.875	-.097	.064
Number of new product launches	.187	.063	.849	.112	.082
Number of new patents	.038	.158	.815	.019	.107
Sales revenue	.031	.139	-.003	.910	.021
Sales growth	.005	.039	.169	.840	.183
Operating income	.269	.112	-.156	.640	.096
On-time delivery	.192	.232	.014	.102	.840
Customer response time	.110	.040	.151	.234	.811
Survey of customer satisfaction	.150	.245	.114	-.008	.654
Eigenvalues% of variance explained	5.58	2.24	1.84	1.42	1.15
	17.95	14.53	14.44	12.77	12.20

Further, the author explored whether the use of financial, product-focused customer, time-focused customer, internal processes, and innovation measures varies between adopters and non-adopters of BSC. In so doing, the T-test was performed. Table 10 presents the results of this test. As shown in Table 10, the mean scores on the use of multiple performance measures for adopters vs. non-adopters of BSC indicate that adopters tend to rely more on product-focused customer measures, time-focused customer measures as well as financial measures than the non-adopters. The results of the T-test suggest significant differences between these two groups for the three dimensions of performance measures. However, in the case of internal processes and innovation dimensions, the differences in the use of multiple performance measures between the two groups are not statistically significant.

Table 10
T-Test for Group Means Comparison for BSC Dimensions

	<i>Mean</i>		<i>p-value</i>
	<i>Adopters</i>	<i>Non-adopters</i>	
Product-focused customer	5.5095	4.9094	0.047
Time-focused customer	5.9714	5.6208	0.051
Financial	6.2095	5.8708	0.034
Internal processes	5.5221	5.2173	0.181
Innovation	4.1048	3.9219	0.566

5. DISCUSSIONS, IMPLICATIONS, AND LIMITATIONS

Hypothesis 1 was confirmed from the results of this study. Despite the importance of non-financial measures highlighted in the literature, this study provides additional evidence that financial measures are used more extensively by manufacturing firms than non-financial measures. This study confirms many previous studies (e. g. Gosselin, 2005; Lingle and Schiemann, 1996; Anand *et al.*, 2005). Borrowing the explanation given by Rich (2007), the bias towards financial measures is mainly because they are more standardized measures, which are common between business units. According to Lipe and Salterio (2000), managers have cognitive difficulties working with measures to evaluate performance that are specific to a situation (unique measures) and therefore prefer measures that are the same for different situations (common measures). Unique measures are essentially non-financial measures while common measures are essentially financial measures.

Hypothesis 2 was not confirmed from the results of means comparison between adopters and non-adopters of BSC. It seems that the majority of performance measures in the financial category were used more extensively by adopters of BSC and less extensively by non-adopters of BSC. As suggested by Rich (2007), the results imply that the BSC could be failing in its intention to reduce bias towards financial measures. Similarly, the study reveals that the use of non-financial measures was more among the BSC adopters than the non-adopters. It shows that the BSC adopters in Malaysian manufacturing firms do incorporate a set of non-financial measures in their performance measurement system. This is particularly true for the use of customer related measures. These results suggest that the BSC adopting firms appear to demand that their general mission statement on customer service is translated into specific measures that reflect the factors that really matter to customers. This is in line with the customer orientated strategy that is believed to be followed by these BSC firms. According to Deshpande *et al.* (1993, p. 27), customer orientation is “the set of beliefs that puts the customer’s interest first, while not excluding those of all other stakeholders in order to develop a long-term profitable (viable) enterprise.” Concerning the use of internal processes and innovation measures, there was no significant difference between the two groups. One possible explanation for these results could be due to the fact that the adoption of BSC was still at the early stage for many Malaysian firms at the time this study was conducted. In fact, it was less popular than it is now. Thus, these findings imply that more reliance on the financial and customer related measures and less reliance on the internal processes and innovation measures is attributable to the adopters having little experience of the BSC.

Further, the results also find no evidence to support *H3*. This study reveals that the performance of BSC adopters and non-adopters is not significantly different. Thus, this study is not able to support the assertion that the BSC adopters should outperform the non-adopters. The findings are not consistent with a similar study of the banking industry (Davis and Albright, 2004), which revealed superior financial performance for branches implementing the BSC when compared to non-BSC implementing branches. This is very consistent with Gosselin’s (2005) argument that a few empirical studies conducted during the 1990s have not really been able to test the impact of the BSC on performance. A significant improvement in performance indicators is not shown as a result of adopting BSC. Again, this outcome could be due to the fact that BSC is rather new to some Malaysian manufacturing firms and many of those firms

that adopt it are still at the development stage or initial stage of implementation. Perhaps, these firms did not receive universal acceptance, involvement, or commitment from the employees, which are prerequisites for successful development and implementation of BSC. It could also be that the BSC adopting firms failed to incorporate a set of non-financial measures into the BSC in a logical and systematic manner thereby leading to the lack of a coherent linkage between the measures chosen and the targeted performance (Davis and Albright). Another important issue is that it is important for performance measurement to be eventually tied to compensation so that the correct employee attitude will be acquired and BSC will be successfully implemented. In addition, successful implementation of BSC and benefits gained from it also depends on how BSC is applied (Malmi, 2001).

Further, this study finds support for *H4*. As expected, the size of the BSC adopting firms is much larger than the non-adopting firms. This explains that firm size is an important factor for implementing the BSC. This evidence is consistent with a prior study by Hoque and James (2000) and Speckbacher et al. (2003) and other similar studies with respect to the effect of size on accounting and budgetary control practices (e.g. Merchant, 1981; Ezzamel, 1990). This result offers an explanation that as size increases, firms seem to be involved in more complex operations, thus the need for broader, comprehensive, multiple, and non-financial measures increases. Since the BSC is regarded as a significant innovation in performance measurement systems, this finding in one way or another supports the argument that adoption of innovation is associated with larger organizations (Moch & Morse, 1977; Blau & McKinley, 1979). In addition, the implementation of the BSC requires a large amount of resources. Therefore, only large firms with sufficient capital resources are able to implement it as according to Hicks (1997) and Finch (1986), size can be associated with capital resources.

The findings of this study produce at least three practical implications. First, despite extensive literature on the importance of non-financial performance measures in providing better indicators of performance, many Malaysian manufacturers still rely on traditional financial measures to a large extent. Nevertheless, the use of non-financial performance measures is gaining momentum, particularly for measures relating to the customer. Second, the adoption of the BSC is influenced by the size of firms. As implementation of the BSC requires a large amount of capital resources and expertise, only the bigger firms are able to adopt it. Third, firm size is an important contextual variable that may affect the design and characteristics of the performance measurement system, such as BSC.

It is worth noting that this study is not free from inherent limitations. The main limitation is concerning the use of cross sectional data. Using cross sectional data does not allow us to observe the effects of emphasizing non-financial measures on financial performance. In relation to this, Kaplan and Norton (1992, p. 71) argued that non-financial measures such as customer satisfaction, internal process improvements, and an organization's innovation and improvement activities reflect the effect of current managerial actions that will not show up in financial performance until later. This limitation serves as an explanation for the findings in this study. Another limitation is the deliberate omission of contextual variables such as strategy and reward systems. This study ignores the strategy in assessing the use of performance measures. For the BSC to succeed, performance measures should be linked to strategy because not all measures are equally important for driving strategy all of the time (Reinsinger et al., 2003). Further

research is needed to examine how the benefits of the BSC are affected due to types of strategy. Further, this study ignores the link between BSC measures and compensation system. Tying compensation to scorecard measures will provide more incentive for managers and employees to successfully implement the BSC and build organizational commitment to its strategic objectives. In fact, according to Rich (2007), managers do not equally weight performance measures when making comparative bonus allocation decisions. In relation to this, Atkinson and Epstein (2000) argued that as the BSC affects rewards, managers must take into account not only organizational structure and systems when implementing the balanced scorecard; but they must also consider their organization's history, management style, and culture.

Finally, the study covers only manufacturing industries. Therefore, any generalization of the results to other industries requires caution. Future studies could be conducted within service industries or public sector organizations so that more understanding on the use of multiple performance measures, in particular the BSC, in different settings could be gathered in order to explore how its benefits are influenced by different industries.

6. CONCLUSION

In summary, this study provides additional empirical evidence on the application of the BSC as a performance measurement tool. Despite the popularity of BSC as a performance measurement and management tool, the adoption of this tool in Malaysia is still low. Surprisingly, quite a number of firms do not adopt BSC because they do not have adequate information concerning its relevance or usefulness. In fact, many firms still rely on financial measures and use them more extensively compared to non-financial measures. Surprisingly, the BSC adopters seem to rely more on both financial and non-financial measures compared to non-adopters.

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