The combined effect of costing and performance management systems on performance, moderated by strategy: Australian context

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Abstract

In this paper we examine the relationship between costing systems and performance management systems and their combined effect on performance under alternative competitive strategies across a number of industry sectors in Australia. A structured questionnaire approach to data gathering is utilised. The findings report that cost leader firms that use a combination of activity-based costing (ABC) and balanced scorecard (BSC) have greater organisational performance, customer performance and innovation performance compared with differentiator firms. In addition, cost leader firms that use a combination of ABC and the BSC have improved their innovation and financial performance more than those who use ABC without BSC or those who use BSC without ABC. Furthermore, differentiator firms that use BSC without ABC have improved customer performance when compared with those that use a combination of ABC and BSC. The study also revealed that the use of ABC and the BSC is contingent on the strategy a firm pursues. Hence, this component is included as an independent factor.

Keywords: activity-based costing, balanced scorecard, performance, strategy

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Introduction

Given the current economic environment, organisations are fighting just to stay afloat. Increasing competitive pressure in this business environment is forcing decision-makers to obtain more accurate cost information and to utilise multiple-dimensional measures of performance (Senthil & Wan Nur Azah, 2010). Responding to competitive pressure, organisations are competing progressively more on a variety of product and service dimensions (Stenzel & Stenzel, 2004). Quality and cost control has become a qualifying dimension to compete in the market place to satisfy customers' needs (Drury, 2000).

Activity-based costing (ABC) plays a significant role in providing accurate cost information, whilst the balanced scorecard (BSC) assists in improving business performance through its diversified financial and non-financial performance indicators (Garg & Rafiq, 2002; Kaplan & Norton, 2001). ABC is a method aimed at increasing the accuracy of cost allocation and is often viewed as a supportive measurement system for successful implementation of BSC (Maiga & Jacobs, 2003). Competitive strategy looks to how the firm will manoeuvre and play within a particular competitive environment. It is expected that differing strategies will require different management accounting techniques with which to remain competitive. Consequently, competitive strategy is included in this study in order to determine the effect that not only the competitive environment has on an organisation's performance, but also how this variable affects performance when either ABC and/or a BSC is utilised. For the purpose of this study, competitive strategy is referred to as simply strategy at the business unit level.

It has been found in previous studies in the US that firms using ABC have increased performance (Shim & Stagliano, 1997). It has also been found that firms using a BSC following either a cost or differentiation strategy (Chenhall & Langfied-Smith, 1998a; Prajogo, 2007) have increased performance, however, it is recognised that different competitive strategies focus on different financial and non-financial indicators to achieve this. For example, cost leader firms will have a slightly different generic BSC as opposed to differentiators, due to the different strategic focus of the two types of firms. Given these relationships, it is expected that there will be a positive effect on organisational and individual performances when firms combine a costing system that will provide more accurate costing with a BSC that is designed to suit the particular strategy that the firm is pursuing.

It is expected that the combined use of ABC and BSC is particularly suitable for those firms which follow a cost leadership strategy, as this will help perpetuate the firm's low cost position. Maiga and Jacobs (2003) argued that the implementation of ABC when combined with BSC is likely to have a significant

positive impact on organisational performance. They found that product quality, customer satisfaction and margin on sales were significant positive functions of the interaction between BSC alternative perspectives and ABC. Many researchers have found varying results but none have specifically linked ABC, performance management systems and strategy to performance. Existing literature on management accounting systems (MASs) shows a lack of empirical studies that examine the combined relationship between costing systems and performance management systems on performance with competitive strategy. Rather, the literature shows numerous studies that examine each implementation variable separately (Bergin-Seers & Jago, 2007; Prajogo, 2007; Debusk & Crabtree, 2006; Ittner *et al.*, 2003; Ittner *et al.*, 2002). Research exploring the relationship between the study's variables will provide managers with greater understanding of the combined use of ABC and BSC for organisational and individual performances improvement and extend MAS literature, particularly in an Australian context. Thus, this study seeks to detect the combined relationship between costing systems and performance management systems by answering the following fundamental question:

Do cost leader or differentiator firms perform better when they use a combination of ABC and BSC as opposed to a combination of either of these with traditional performance management and costing systems?

Prior research on costing systems, performance management systems, strategy and the relationship between the variables is examined in detail in the literature review. The theoretical framework and research methodology is explained, followed by a presentation of the results. A discussion of the results and concluding comments finalise the paper.

Literature review

Activity-based costing

Traditional cost information leads ultimately to a distortion of product and service costs, which can mislead strategic decisions related to pricing, marketing, customers and profitability. Among one of the most important challenges that attracts the attention of managers today is the accuracy of cost information. In many areas of contemporary business, it has been realised that activity levels other than final output volume are significant determinants of overhead. In these circumstances, conventional overhead costing no longer applies. Overheads are increasingly influenced by the diversity and complexity of output and by the need to ensure quality and high service levels to customers in an increasingly competitive marketplace. This involves first segmenting the overhead area into activity-based cost pools, each of which is related to a specific type of cost-causing transaction. A volume measure of the transaction is then used to compute a cost rate for each activity (by dividing the activity cost by the transaction volume). These multiple rates can then be used to cost final

outputs on the basis of the volume of each type of transaction relating to each product or service line.

The adoption of ABC has frequently resulted in significant differences in output costs from those obtained by more conventional means. This reflects the underlying patterns of activity usage by outputs. In particular, high-volume standard outputs have been found to cross-subsidise low-volume customised outputs. These revised costings have, in many cases, led to reappraisals of product range, pricing and marketing policies. Hence, with reliable cost information, managers are able to make better strategic decisions. ABC information has been used for management operating decisions that have an impact on profitability and, ultimately, shareholder value (Ittner *et al.*, 2002; Garg & Rafiq, 2002; Kennedy & Affleck-Graves, 2001). Empirical evidence by Kennedy and Affleck-Graves (2001) suggested a significant improvement in firm performance in terms of both market and accounting-based measures for ABC firms compared with their matched non-ABC firms.

Associated with the above, ABC plays a vital role at the managerial level in providing accurate cost information which improves product and service costing, thereby enhancing pricing decisions, product mix and transfer pricing. ABC also analyses activities by distinguishing the activities that add value from those that do not add value to the organisation or its outputs. This turns managers' decisions in the right direction for information needed to reduce costs by designing products and processes that consume fewer activity resources. This, in turn, increases the efficiency of existing activities, eliminates activities that do not add value to customers and improves coordination with customers and suppliers (Ittner *et al.*, 2002). Cagwin and Bouwman (2002) investigate the improvement in financial performance that is associated with the use of ABC. The results show that there is indeed a positive association between ABC and improvement in financial performance (ROI) when: ABC is used along with other strategic initiatives; implemented in complex and diverse firms; used in environments where costs are relatively important; and when there are limited numbers of intra-company transactions. Moreover, the accuracy of cost information obtained by ABC can be viewed as a supportive measurement system for successful implementation of BSC (Maiga & Jacobs, 2003).

Balanced scorecard performance systems
Performance measures can be represented by a single dimension (e.g. financial measures), or it can be multi-dimensional and include both financial and non-financial measures. In this regard, Hoque *et al.* (2001) found a positively and significantly correlated relationship between using multiple measures of performance, computer-aided manufacturing processes and the intensity of market competition. Single-dimension performance is accounting-based and focuses solely on financial criteria (e.g. return on assets (ROA) or return on

investment (ROI)) to evaluate an organisation's performance (Hoque *et al.*, 2001). Today organisations need to adopt a more balanced approach to measure their organisational performance by considering financial and non-financial measures. Significant attention is now being given by academics and managers to building a more extensive and linked set of measures for appraising and directing corporate and divisional performance. This attention has been influenced largely by Kaplan and Norton's (1992) notion of BSC. By combining the financial, customer, internal process and learning and growth perspectives, BSC helps managers understand many interrelationships, at least implicitly. This understanding can help managers transcend traditional notions about functional barriers and ultimately lead to improved decision-making and problem solving (Kaplan & Norton, 1992).

Hoque and James's (2000) study reported a significant association between size and BSC usage as size increases, and that organisations find it more practical and useful to place greater emphasis on a BSC that supports their strategic decision-making. Contrary to the notion that firms that have a higher proportion of new products have a greater tendency to make use of measures related to new products, Hoque and James found a negative association between a firm's market position and BSC usage. A study by Bergin-Seers and Jago (2007) explored the measurement of performance in small motels in Australia. The study indicates that owner-managers who operate successful motels utilise a balanced approach to performance measurement by utilising a number of measures to monitor results and review management activities. Debusk and Crabtree's (2006) study indicated firms that implemented BSC had improved their performance, and regular users of BSC were from a variety of industries from manufacturing to service organisations to non-profit organisations.

The accuracy of cost information obtained by ABC is often viewed as a supportive measurement system for successful implementation of BSC (Maiga & Jacobs, 2003). Results from Maiga and Jacobs's study showed that there is an interaction between the four BSC perspectives and ABC on product quality. They also found that customer satisfaction is a significant positive function of interaction between the four BSC perspectives and ABC. In addition, margin on sales was identified as another significant positive function of the interaction between BSC, customer, financial, and learning and growth perspectives and ABC. It is expected that the timeframe in BSC implementation might affect the result of organisational performance as the potential benefit of BSC is not realised immediately—subsequently, this was included as a variable when measures were constructed for BSC.

Strategy
This study utilises Porter's classification of competitive strategy as it is the most cited method within studies of competitive strategy and performance (Guthrie *et*

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al., 2002; Nayyar, 1993). Porter (1985) identified three strategic approaches to outperforming other firms in an industry. They are overall cost leadership, differentiation and focus. As Porter argued, the cost leadership strategy aims to achieve overall cost leadership in an industry through a set of necessary procedures aimed at this objective. The second strategy that Porter promoted is one of differentiation—creating something that is perceived industry wide as being unique. This can either be by product, brand image, technology, customer service or dealer network. Differentiation strategies do not allow a firm to ignore costs, however, they are not its primary focus. The final strategy focuses on a particular buyer group, segment or product line, or geographic market that is creating a market niche. A firm pursuing a focused strategy attempts to serve a particular target very well and, in doing so, simultaneously develops one of the other two functional strategies (Porter, 1985).

The relationship between ABC, BSC and strategy

As discussed, ABC is a method for allocating cost in a much more efficient and accurate way than that of a traditional costing system (TCS). Also discussed were the benefits of firms using BSC. It has been found in previous studies in the US that firms using ABC have increased performance (Shim & Stagliano, 1997). It has also been established that firms using BSC and following either a cost or differentiation strategy have increased performance, although it was noted that different competitive strategies focused on different financial and non-financial indicators to achieve this. It is expected that given these relationships, there will be a positive effect on organisational performance when firms combine a costing system providing more accurate costing with a BSC that is designed to suit the particular strategy that the firm is pursuing. Cost leader firms attempt to maintain a stable base of customers and products by competing primarily on competitive price, supported by their focus on efficient operations. Improving efficient operations can be achieved by an emphasis on the BSC's internal business process perspective, which comprises indicators such as ratio of good output to total output and on-time delivery. Firms that aim to be a low cost supplier of products or services and achieve their competitive advantage, must have accurate cost information in order to become a cost leader firm. Kaplan (2001) pointed out that assigning resources expense to activity and process costs provides the first link between ABC and BSC. This link arises in the operational excellence component of the scorecard's internal perspective. So the cost measurement in the BSC's internal perspective should come from a properly constructed ABC model. Measurement of customer profitability is the second link between ABC and BSC. A study by Olson and Slater (2002) determined whether benefits can be derived from matching an emphasis in the scorecard to strategy type. Among their findings is that high-performing, low-cost defenders place greater emphasis on the financial perspective than do low-performing ones. High-performing, low-cost defenders also place significantly lower emphasis on both the customer and the innovation and growth

perspectives than low performers do. This suggests that attempting to get close to their customers and pursing innovation and market growth detracts from low-cost defenders' quest for efficiency. Further, they found that high-performing differentiated defenders place more emphasis on the customer perspective than low-performing ones. It was also found that high-performing differentiated defenders place greater emphasis on the innovation and financial perspectives more than do low performers. Given these findings, in contrast to previous arguments, the balanced scorecard may in actual fact not be intended to balance that is, it could actually be a deliberate strategic alliance with the firm's performance management system. Chenhall and Langfield-Smith (1998b) found that firms which emphasised differentiation strategies benefited from the use of management accounting innovation and reliance on non-financial information, and this ultimately resulted in better performance. Recently, Prajogo (2007) examined the individual impact of differentiation and cost leadership and their interaction effect on quality performance for manufacturing and non-manufacturing sectors in Australia. The findings of this study indicated that product quality was predicted by differentiation strategy, but not cost leadership strategy. It also found that the relationship between differentiation strategy and quality is moderated by the effect of cost leadership whereby the higher the cost leadership, the stronger the effect.

Theoretical framework

A contingency framework has been devised that presents a model illustrating the effect of the relationship between performance and the interaction of strategy, ABC and BSC. As discussed in the literature, a firm's strategic focus will depend on its competitive environment. Also discussed is how ABC can improve a firms' cost information and how BSC provides a much clearer and focussed performance management system. Figure 1 depicts these relationships.
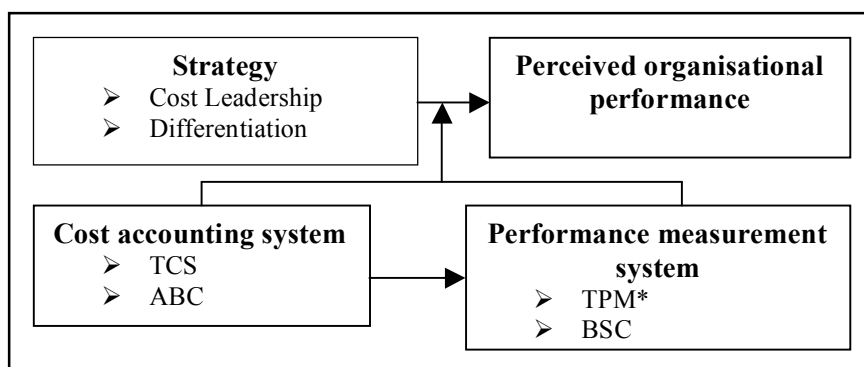
*TPM is traditional performance measures
Figure 1: Theoretical framework of the study

The model presented in Figure 1 reveals the relationship between the use of ABC and BSC on perceived organisational performance. It also indicates how an ABC system can provide critical insights into BSC measures by providing valuable and accurate input to the four perspectives of BSC to improve firm performance.

Porter (1985) suggested that a cost leader firms' focus is more on cost, but they should not ignore differentiation entirely. Rather, they should tend to focus on controlling costs, thus, ABC is particularly suitable for these firms. ABC information may be useful in controlling or reconfiguring existing business processes superior to those of competitors, thereby helping managers to choose new ways of achieving cost advantage (Cooper, 1995). Therefore, it is expected that there will be greater organisational performance for cost leadership firms that use a combination of ABC and BSC than those adopting the singular use of ABC or BSC. The following hypotheses have been developed in regard to this claim:

H1: Cost leadership firms that use a combination of ABC and BSC will have greater performance than cost leadership firms that use ABC without BSC.

H2: Cost leadership firms that use a combination of ABC and BSC will have greater performance than cost leadership firms that use BSC without ABC.

The BSC, along with improved costing information provided by ABC, will provide greater monitoring of achievement of strategic goals, thus increasing organisational performance. Therefore, as can be seen from Figure 1, an ABC system and the BSC can play a complementary role in contributing to a company's mission, objectives and strategies. The increased accuracy provided by ABC enhances the ability to develop more effective strategies to meet organisation objectives (Cooper & Kaplan, 1992). This, in turn, increases the likelihood of an organisation's success in carrying out its defined objectives and missions. At the same time, an organisation can use a BSC to help monitor how well it is meeting strategic objectives and overall mission (Garg & Rafiq, 2002; Kaplan & Norton, 1992, 1996b, 2001). Furthermore, with respect to the design and use of a performance system, contingency-based research suggests that financial measures may not be appropriate under all circumstances, and that they may need to be supplemented with non-financial measures of performance. Additionally, it is likely that differing strategic orientations will place greater emphasis on different perspectives of BSC, resulting in what might appear as a BSC that is not quite balanced but one nonetheless that is matched with the organisation's strategic direction. As such, cost leaders may well place a greater emphasis on financial and efficiency measures of performance but still monitor other non-financial areas of their firm relating to customer, learning and growth.

Thus, feedback from this particular loop necessitates actions that, in turn, increase organisational performance. Hence the derivation of the following hypothesis:

H3: Cost leadership firms that use a combination of ABC and BSC will have greater performance than differentiator firms that use a combination of ABC and BSC.

As noted by Porter (1985), differentiator firms focus their strategic priorities on satisfying customer needs for high quality products, fast and reliable delivery and effective post-sales support. In achieving these strategic priorities, firms may focus and rely more on non-financial measures than financial measures to improve organisational performance. Chenhall and Langfield-Smith (1998b) found that firms which emphasised differentiation strategies benefited from the use of sophisticated management accounting practices and reliance on non-financial information, and this ultimately resulted in better performance. Shank (1989) and Lynch and Cross (1992) argued that firms emphasising differentiation strategies that use traditional accounting performance measures are unlikely to have sufficient evidence for assessing how production processes support a variety of customer-focused strategies. It is expected that since a differentiator firm will have less focus on cost, it will benefit from using a BSC approach for improving organisational performance. As mentioned previously, it is likely that differing strategic orientations will place greater emphasis on different perspectives of BSC, resulting in what might appear as a BSC that is not quite balanced but one that suits the organisation's strategic direction (i.e. a greater focus on measurement that focuses on differentiating objectives). It is expected that the benefits for differentiators using both systems will outweigh the benefits of not using any system. This results in greater performance for differentiator firms that use both, as opposed to none, but not as great as for differentiator firms that only use BSC. Hence, the following hypothesis has been established:

H4: Differentiator firms that use BSC without ABC will have greater performance than differentiator firms that use a combination of ABC and BSC.

Research method

Data were collected from 1771 firms (using mail-out survey) across a number of industry sectors in Australia that utilise varying strategic postures. The questionnaire in this study was sent with a cover letter and a reply and postage-paid envelope. The cover letter was addressed to the Chief Financial Officer (CFO) of each business unit. Previous research conducted by Hoque and James (2000) indicated that the CFO is the optimal person to direct questions relating to the variables of the study, as they are most likely to be able to provide accurate information about costing and performance measurement data within

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the firm. In this study, firms with less than 200 employees were categorised as small, firms with 200 to 500 employees were categorised as medium while those firms with more than 500 employees were categorised as large firms. Size and nature of business were the criteria used for sample selection, thus no deviation is expected among the main industries. The selection of the sample was randomly selected from the Business Who's Who (BWW) database, based on 30 sub-industries. Approximately 25 firms from each sub-industry were selected, using a random numbering technique.

From the 1771 questionnaires sent out, 229 surveys were returned as positive responses. These positive responses include 30 firms that were involved in both cost leadership and differentiation strategies and were excluded from the analysis.[2] Therefore, the remaining useable response is 199 firms, and these were used for statistical analysis. Further, 350 surveys returned as negative responses (explanations included that it is against company policy to take part in non-government surveys, that they were no longer at this address, not applicable to the study or not being interested in completing such surveys). The remainder (1192 surveys) was deemed non-responses. Figure 2 depicts response categories of the participants.
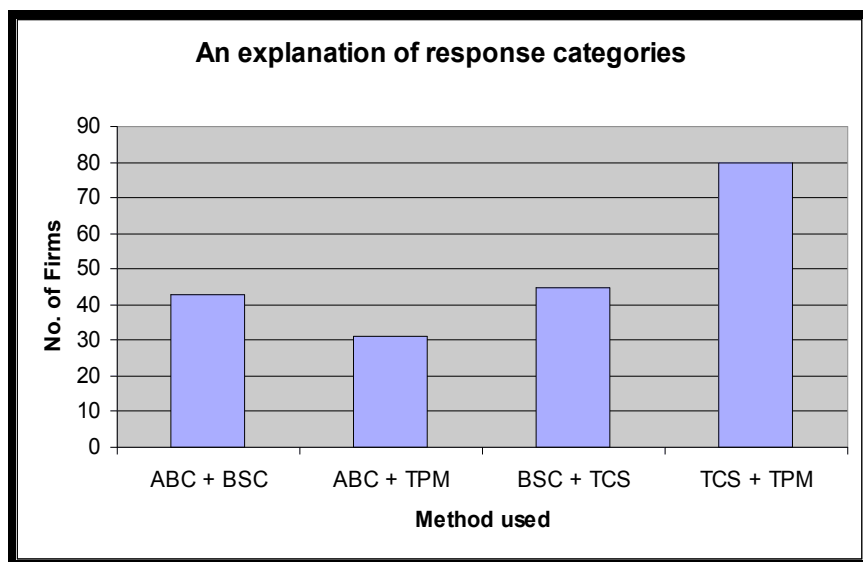

Figure 2: Categories of responses

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[2] These responses were weighted on the middle of the scale, which cannot be separated into cost leadership or differentiation strategy.

The total response rate is 14.3 %. From the positive responses obtained from the 199 firms, 43 firms (21.6%) used ABC and BSC jointly, 31 firms (15.6%) used ABC and TPM, 45 firms (22.6%) used BSC and TCS and 80 firms (40.2 %) used traditional methods that included TCS and TPM. To test for the existence of possible response bias, t-tests for the sample was undertaken by testing first and second mailing returns as suggested by Levine *et al.* (2005). Given that each category had more than 30 responses, this sample size is considered more than adequate for statistical testing (Selvanathan *et al.*, 2004).

Table 1: Sample by industry and size

Category	No. of cases	Number of employees		
		< 200	200–500	> 500
Industry*				
Retail:	**10**	**1**	**6**	**3**
Building materials, hardware, garden supply & mobile home	4	1	2	1
General merchandise stores	2	-	2	-
Apparel & accessory stores	2	-	1	1
Food stores	1	-	1	-
Other retails	1	-	-	1
Manufacturing:	**41**	**4**	**16**	**21**
Food, beverage & tobacco products	9	-	4	5
Textile, clothing, footwear & leather products	6	1	2	3
Lumber & wood products, furniture & fixture	1	-	1	-
Paper, printing, publishing & allied products	5	-	2	3
Chemicals, petroleum refining, oil & gas	6	2	1	3
Rubber, miscellaneous plastics products, clay, glass & concrete products	4	-	2	2
Primary metal, fabricated metal products & transportation equipment	5	1	2	2
Industrial & commercial machinery & computer equipment	4	-	2	2
Other manufacturing	1	-	-	1

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Services:	**54**	**8**	**15**	**31**
Hotels, rooming houses, camps & other lodging places	7	1	5	1
Entertainment	4	-	2	2
Business services	5	1	1	3
Health & social services	12	5	1	6
Education services	16	1	1	13
Automotive repair, services & parking	4	-	2	2
Trade, professional & community membership organisations	4	-	2	2
Other services	2	-	-	2
Finance, insurance & real estate	**18**	**4**	**3**	**11**
Finance & banking	12	1	3	8
Insurance	4	2	-	2
Real estate	2	1	-	1
Other industries:	**76**	**21**	**18**	**37**
Agriculture, forestry & fishing	7	1	1	5
Wholesale trade	6	-	3	3
Transportation, communications, utilities & sanitary	27	8	4	15
Mining & construction	34	12	9	13
Others	2	-	1	1
Total	**199**	**38**	**58**	**103**

N = 199
* Industry classification was done using BWW classification after integrated from nine main industries into five main industries.

Measurement of the variables

Organisational characteristics
This variable includes several types of measurements as identified by Chongruksut (2002). Most participant firms are public organisation (52.8%), followed by private organisations (40.7%), and 6.5% are government owned organisations. The number of employees ranged from less than 200 to more than 501. 51.8% of the respondent firms have 501 or more employees and were categorised as large firms, 29% have between 200 and 500 employees and were categorised as medium firms, while 19.1% were categorised as small firms. In terms of number of products/services, 43.2% of respondent firms have produced 51 or more of the products/services. In addition, 36.2% and 28.1% of respondent firms have occasionally and fairly often introduced new products/services respectively.

Strategy

The current study measures strategy using the typologies identified by Porter (1985) of cost leadership and differentiator. Respondents were given a brief description of a cost leader and differentiator organisation. In addition to this, participants were given clarification that firms need not necessarily be at either extreme end of the scale, but may incorporate factors of both strategies. Participants were required to select their firm's strategic orientation that best represented their organisation (Abernethy & Guthrie, 1994) on a scale of one to seven (1 = cost leadership firm and 7 = differentiator). There were 79 firms among the varying industries which were competing using a cost leadership strategic orientation for their products and services, and 120 firms among the various industries aimed to be unique in their industry in terms of customer service and/or product differentiation. A further 30 firms were involved in both lower cost and differentiation; however, these firms were not used in the statistical analysis. Table 2 presents the strategic orientation by firms' cost accounting allocation bases and performance measurement systems adopted in their management accounting system.

Table 2: Strategy type[3]

Strategy type	Method used				Total
	TCS + TPM	ABC + TPM	TCS + BSC	ABC + BSC	
Cost leadership	29	13	16	21	**79**
Differentiation	51	18	29	22	**120**
Total	**80**	**31**	**45**	**43**	**199**

Activity-based costing

Participants were asked whether they use an ABC system or TCS as cost allocation basis for assigning overheads. Those firms using the ABC approach to allocate overhead costs were also surveyed on six ABC variables. These variables were related primarily to the basic framework of Shields (1995) but also to that of Maiga and Jacobs (2003) and Chongruksut (2002). Specifically, data were collected on six ABC variables which support ABC implementation: management support; clear and concise objectives; competitive strategy link; adequate resources; non-accounting ownership; and performance evaluation/compensation (assumed to be closely related to ABC success). These variables were put to respondents using a seven-point Likert scale, ranging from one (strongly disagree) to seven (strongly agree). Further, the length of

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[3] Strategy type by method used cross-tabulation

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implementation time of ABC has been considered when measuring the effect of ABC on organisational performance by asking managers how long it has been in use in their organisation. Similarly, this method was also used in the current study.

Following Shields (1995), a principal component analysis with Varimax rotation was used, which produced one factor with total variance of 56.40 % and eigenvalues greater than one. A reliability check for the ABC measures produced a Cronbach alpha of 0.84, indicating that the measures were reliable (Pallant, 2005). The loadings of the measures are also consistent with Shields (1995). To compose the measurement for the model, a mean score of the responses to the six items in the questionnaire was computed as the measure of ABC success. Each of the variables was found to significantly correlate with one or more of the other variables. Furthermore, there were 74 (37.2 %) companies using ABC in allocating overhead costs, three of which have less than six months experience using ABC, six firms had been using ABC for six months to one year, 11 firms had experience of one to two years and 45 firms had been using ABC for more than two years.

Balanced scorecard performance management system
This variable was measured firstly by asking the participant whether they use a BSC approach or TPM. Secondly the BSC variable was measured using the four dimensions consistent with Kaplan and Norton's (1996b) concept of BSC. It included the 20 items tested by Hoque *et al*. (2001) and again utilised by Maiga and Jacobs (2003) in their study. The respondents were asked to indicate their use of particular indicators for each of the different items that represent the various dimensions of BSC on a 7-point Likert-type scale, ranging from one (not at all) to seven (to a great extent). This enabled a weighted measure to be developed that identifies a cost leader BSC, a differentiator BSC and an overall BSC for use in the hypotheses. To avoid any bias toward organisational performance, overall weighted BSC variables were created for each of the differing strategies, given that each strategy had a different generic BSC because of its strategic focus. In order to control commonality effects of experience and organisation learning, the length of time the BSC has been in use in the organisation was considered when measuring the effect of BSC on organisational performance by asking managers how long it has been in use in the organisation. Results indicate that there were 88 (44.2%) sample companies using BSC as a performance management system. Of those, 71 firms implemented it at a corporate level and 17 firms at the whole organisation level. Additionally, 111 (55.8%) firms were still using traditional performance measures indicators as a performance management system.

Following Maiga and Jacobs (2003), a principal components analysis of 32 measurements was conducted to decide whether to combine them into overall

factors. This analysis extracted four factors with eigenvalues greater than one, consistent with Kaplan and Norton's (1993 and 1996b) BSC. To represent the extent of BSC usage, a mean score was calculated for each of the four BSC perspectives. Table 3 presents the descriptive statistics, the factor loadings of the items that loaded most highly on each factor after orthogonal (Varimax) rotation, the percentage of variance explained by each factor and a factor title. The four factors of the principal components analysis accounted for 65.1 % of the overall variance, which was considered adequate (Howell, 1997). The Cronbach coefficient alpha statistics for each factor involving aggregation were well above the lower limits of normal acceptability (Nunnally & Bernstein, 1994). The BSC is presented by the aggregate score of all indicators within the alternative perspective, the higher the score, the greater the usage of the BSC performance management system. The Cronbach coefficient alpha statistic for measure was 0.89, indicating that the scale is reliable with the research's sample.

Table 3: Descriptive statistics and factor loadings for balanced scorecard indicators

Description of variables	Mean	Median	% of variance	Cumulative %	Cronbach alpha
1. Internal Business Perspective			33.69	33.69	0.90
% defective products shipped	2.73	2.00			
Ratio of good output to total output	2.88	2.00			
Rate material scrap loss	2.49	1.00			
Materials efficiency variance	2.86	2.00			
Manufacturing lead time	2.68	1.00			
% shipments returned due to poor quality	3.00	2.00			
On-time delivery	4.53	5.00			
Labour efficiency	4.20	5.00			

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Description of variables	Mean	Median	% of variance	Cumulative percentage	Cronbach alpha
2. Innovation and Learning Perspective			14.98	48.67	0.88
Employee satisfaction	4.73	5.00			
Investment in training	4.32	5.00			
Employee turnover	4.43	5.00			
Intellectual assets	3.75	4.00			
3. Customer Perspective			8.65	57.32	0.85
Customer satisfaction	5.13	6.00			
No. of customer complaints	4.54	5.00			
Gains & losses of customers	4.20	5.00			
Average time from customer contact to sales response	3.63	4.00			
4. Financial Perspective			7.76	65.08	0.73
Shareholder equity/to total assets	4.00	4.00			
Return on sales	4.77	5.00			
Return on investment	5.12	6.00			

Organisational performance

This variable was measured using the four dimensions of perceived organisational performance consistent with Hoque *et al.* (2001), Evans and Lindsay (2002), and Hoque and James (2000). Maiga and Jacob's (2003) study also used three of these dimensions, namely, product quality, customer satisfaction and margin on sales. The study herein used all the dimensions identified by Hoque and James (2000), as this instrument focused not only on financial performance, but also non-financial performance consistent with the BSC dimensions. Respondents were asked to indicate their organisation's

performance compared to that of their direct competitors along the four dimensions of scale ranging from one (below average) to seven (above average). Table 4 presents the descriptive statistics for the variables, and the Pearson Correlation Coefficients are presented in the Table 5.

Table 4: Descriptive statistics for organisational performance variables

Variables	Descriptive statistics		
	Mean	Median	Std deviation
1. Overall Performance:	3.79	3.83	0.65
2. Financial Performance:			
Return on investment	4.38	5.00	1.52
Operating income	4.90	5.00	1.34
Cash flow	4.97	5.00	1.36
Economic valued added	4.10	4.00	1.49
Shareholder equity/to total assets	4.53	5.00	1.39
3. Customer Performance:			
Gains & losses of customer	3.92	4.00	1.29
Customer satisfaction	4.89	5.00	1.12
Avg time from customer contact to sales result	4.07	4.00	1.22
Service expense per customer	2.60	2.00	1.72
4. Innovation Performance			
Employee satisfaction	4.42	3.80	1.12
No. of new product launches	4.03	4.00	0.99
Performance of innovation	3.80	4.00	1.13
Intellectual assets	3.52	4.00	1.81
No. of new patents	2.30	2.00	0.99
5. Efficiency Performance			
Materials efficiency variance	2.46	1.00	1.75
Ratio of good output to total output	4.14	4.00	1.28
% of defective products shipped	2.34	1.00	1.81
Manufacturing lead time	2.37	1.00	1.84
Rate of material scrap loss	2.43	2.00	1.47
On-time delivery	4.81	5.00	1.19

N= 199

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Table 5: Pearson Correlation Coefficients for the organisational performance variables

	Financial per-formance	Customer per-formance	Innovation per-formance	Efficiency per-formance	Overall per-formance
Financial performance	1.00	.228†	.278†	.002	.591†
Customer performance		1.00	.319†	.398†	.719†
Innovation performance			1.00	.247†	.641†
Efficiency performance				1.00	.671†
Overall performance					1.00

N = 199; (Two-tailed); * p < 0.10; ** p < 0.05; †p = < 0.01

A principal components analysis was conducted on the organisational performance variables. This variable was measured by 32 indicators including financial and non-financial factors. Each of the variables was found to significantly correlate with one or more of the other variables. This analysis extracted four factors with eigenvalues greater than one: financial, customer, innovation and efficiency performance. The overall performance is the sum of the four variables and is included as measure of organisational performance. The 32 measurements become 20 measurements after running principal components loading into four variables: financial, customer, innovation and efficiency performance.

Control variables
This study considered three variables as control variables: organisational size, the length of time of use of ABC and of BSC. Organisational size was measured by number of employees including small, medium and large firms. Research on the size-innovation issue has yielded mixed results. For example, Gosselin (1997) found no statistically significant relationship between organisational size and the decision to adopt activity based management (ABM) and ABC. However, Blau and McKinley (1979), and Tolbert and Zucker (1983) found a positive relationship between size and innovation. Further, in order to control the commonality effect of experience and organisation learning, the length of implementation time of ABC has been considered when measuring the effect of ABC on organisational performance by asking managers how long it has been in use in their organisation. Similarly, the length of time BSC has been in use in the

organisation was considered when measuring the effect of BSC on organisational performance by asking managers how long it has been in use.

Results

Planned Contrasts Analysis (PCA) was conducted to test the research hypotheses. The research hypotheses aim to determine the differences between the firms' focus on cost leadership and differentiation strategies when they combined the use of costing systems and performance management systems. When researchers may be only interested in testing a few specific, well-defined research hypotheses, PCA is then highly recommended (Keppel & Wickens, 2004). PCA is concerned with the analysis of the contrast differences between the cell means. In many cases, particularly when contrasts for simple effects or interaction effects are required, the PCA is best specified in terms of cell means (Bercken & Voeten, 2004). Here, PCA tests the statistical significance of differences between each hypothesis cell[4] of cost leadership firms and differentiation firms. The aim of the hypotheses tests was to determine the differences of organisational performance between firms who focus on cost leadership and firms who focus on differentiation strategies using a combination of ABC and BSC. The hypotheses also aim to explore the differences in those firms that only use either ABC or BSC with traditional performance and costing methods. In addition, the tests explored whether there were any variations between cost leadership firms and differentiation firms in relation to costing systems and performance measurement systems on organisational performance. To further explain, cell one and two address hypothesis one; cell one and three address hypothesis two; cell one and four address hypothesis three; and cell four and five address hypothesis four. The authors are, therefore, seeking the mean differences between the hypothesis cells and their effect on organisational performance. The dependent variable 'organisational performance' was measured by an overall weight of four items: financial, customer, innovation and efficiency performance. Table 6 presents the descriptive statistics obtained from the PCA for organisational performance with five cells.

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[4] There were five cells tested with each dependent variable: cell one is cost leadership firm using ABC and BSC; cell two is cost leadership firm using ABC and TPM; cell three is cost leadership firm using TCS and BSC; cell four is differentiation firm using ABC and BSC; cell five is differentiation firm using TCS and BSC.

Table 6: Descriptive statistics for organisational performance

Cell	Strategy type	Costing systems	Performance management systems	Mean	Std. deviation	N[5]
C1	Cost	ABC	BSC	3.67	0.63	21
C2	leadership[6]	ABC	TPM	3.80	0.64	13
C3		TCS	BSC	3.82	0.82	16
C4	Differen-	ABC	BSC	3.99	0.69	22
C5	tiation[7]	TCS	BSC	3.84	0.59	29

Table 7 provides test results of the research hypotheses. A test of hypotheses H1, H2, H3 and H4 were conducted to determine whether the firms' focusing on cost leadership or differentiation strategies in Australia using ABC and BSC approaches jointly perform better than firms using a singular use of ABC or BSC.

Table 7: Planned contrast analysis results of the hypotheses

Hypothesis	Source	Sum of squares	df	Mean square	F
H1	contrast	0.15	1	0.15	0.35
	error	80.893	191	0.42	
H2	contrast	0.22	1	0.22	0.51
	error	80.893	191	0.42	
H3	contrast	1.16	1	1.16	2.74*
	error	80.893	191	0.42	
H4	contrast	0.32	1	0.32	0.75
	error	80.893	191	0.42	

* $p < 0.10$; ** $p < 0.05$; † $p < 0.01$

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[5] Neter *et al.* (1990) applied linear statistical models, regression, analysis of variance and experimental designs. They argue that unequal size sample is not a problem when using simple contrast analysis and when the researcher is using survey method.

[6] Cost leader firms that use both TCS and TPM are not presented in the table because it is not relevant to the research hypotheses. There are 29 firms cost leader firms using both TCS and TPM.

[7] Differentiation firms that use ABC and TPM, and those that use TCS and TPM are not presented in the table because they are not relevant to the research hypotheses. There were 51 differentiation firms using TCS and TPM, and 18 differentiation firms using ABC and TPM.

C1 and C2 in Table 6 pertain to H1. The PCA test indicates that there was no difference between the mean of C1 and C2. Table 7 substantiates that cost leadership firms using a combination of ABC and BSC were not significantly different to cost leadership firms using ABC and TPM. Subsequently H1 is not supported (p = 0.55).

Associated with Table 6, C1 and C3 were related to H2 and present the mean differences between cost leadership firms that use a combination of ABC and BSC, and those using TCS and BSC. In examining the means of C1 and C3, there is no difference between the mean of C1 and the mean of C3; this is confirmed in Table 7. Subsequently, it can be inferred that H2 was also not supported (p = 0.48).

C1 and C4 in Table 6 identify with H3 and present the mean differences between cost leadership firms that use a combination of ABC and BSC, and differentiation firms that use a combination of ABC and BSC. Comparing the mean of C1 and C4, the findings are different. The output from Table 7 confirms that H3 is weakly supported by the above-mentioned hypothesis (p = 0.10).

C4 and C5 represent H4, which compares the mean of differentiator firms that use a combination of ABC and BSC with differentiator firms that use both TCS and BSC. Table 6 indicates that there is no difference between the mean of C4 and C5. Table 7 indicates that H4 is not supported (p = 0.39).

The authors conducted additional PCA to test the following individual performance items: financial performance, customer performance, innovation performance and efficiency performance.

PCA using individual performance items
As mentioned, organisational performance is measured using the following four individual performance items: financial, customer, innovation, and efficiency performance. To delve further into the effect of ABC and BSC on performance, an additional analysis was conducted using PCA to examine differences between firms using a combination of ABC and BSC on each of the performance items, depending on their status as a cost leader or differentiator firm. The PCA also explored differences in those firms that only use either ABC or BSC with traditional methods. The additional analysis conducted at this point categorised the organisational performance variable into the individual organisational performance items. Thus, the authors placed H1, H2, H3 and H4 into four equations (see Table 8) to distinguish between testing organisational performance and individual performance items.

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Table 8: Performance items equations

H1	E1	Cost leadership firms that use a combination of ABC and BSC will have greater (a) financial performance (b) customer performance (c) innovation performance (d) efficiency performance than cost leadership firms that use ABC without BSC.
H2	E2	Cost leadership firms that use a combination of ABC and BSC will have greater (a) financial performance (b) customer performance (c) innovation performance (d) efficiency performance than cost leadership firms that use BSC without ABC.
H3	E3	Cost leadership firms that use a combination of ABC and BSC will have greater (a) financial performance (b) customer performance (c) innovation performance (d) efficiency performance than differentiator firms that use a combination of ABC and BSC.
H4	E4	Differentiator firms that use BSC without ABC will have greater (a) financial performance (b) customer performance (c) innovation performance (d) efficiency performance than differentiator firms that use a combination of ABC and BSC.

Table 9 presents the descriptive statistics obtained from the PCA test for each individual organisational performance item, and Table 10 provides the PCA test results for the individual organisational performance items.

Table 10, E (1) indicates that cost leadership firms using a combination of ABC and BSC are significantly different to cost leadership firms that use both ABC and TPM. This means that cost leader firms using a combination of ABC and BSC have greater innovation performance than cost leader firms that use both ABC and TPM ($p = 0.086$). However, no difference was found for financial, customer and efficiency performance. Associated with Table 9, C1 and C3 is related to E2. Looking at the mean of C1 and C3, there is a difference between the mean of C1 and C3 for financial and innovation performance. In contrast, there is no difference between the mean of C1 and C3 for customer and efficiency performance. Results in Table 10, E (2) inform that cost leader firms that use a combination of ABC and BSC have greater financial and innovation performance than cost leader firms that use both TCS and BSC ($p < 0.05$ and $p < 0.10$ respectively). However, no differences were found for customer and efficiency performance. C1 and C4 in Table 9 present E3 and, as can be seen,

the mean of C1 and C4 are significantly different for customer and innovation performance but not for financial and efficiency performance.

Table 9: Descriptive statistics for the individual organisational performance items

Cell	Strategy type	Allocation cost system	Performance management system	Mean	Std. devia-tion	N
Financial performance:						
C1	Cost	ABC	BSC	4.71	1.06	21
C2	leadership	ABC	TPM	4.75	0.68	13
C3		TCS	BSC	3.94	1.23	16
C4	Differen-	ABC	BSC	4.79	1.03	22
C5	tiation	TCS	BSC	4.86	1.28	29
Customer performance:						
C1	Cost	ABC	BSC	3.64	0.92	21
C2	leadership	ABC	TPM	3.63	0.98	13
C3		TCS	BSC	3.95	0.85	16
C4	Differen-	ABC	BSC	4.41	0.87	22
C5	tiation	TCS	BSC	3.90	0.63	29
Innovation performance:						
C1	Cost	ABC	BSC	3.15	0.75	21
C2	leadership	ABC	TPM	3.62	0.71	13
C3		TCS	BSC	3.64	0.83	16
C4	Differen-	ABC	BSC	3.75	0.76	22
C5	tiation	TCS	BSC	3.71	0.69	29
Efficiency performance:						
C1	Cost	ABC	BSC	3.17	1.14	21
C2	leadership	ABC	TPM	3.21	1.30	13
C3		TCS	BSC	3.75	1.14	16
C4	Differen-	ABC	BSC	3.02	1.12	22
C5	tiation	TCS	BSC	2.88	1.13	29

Therefore, results from Table 10, E(3) infer that cost leader firms that use a combination of ABC and BSC have greater customer and innovation performance than differentiator firms that use a combination of ABC and BSC (p< 0.01), but no significant differences were found for both financial and efficiency performance. C4 and C5 presented E4, which compares the mean of differentiator firms that use a combination of ABC and BSC with those using

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both TCS and BSC. Table 9 indicates that there is a difference between the mean of C4 and C5 for customer performance, whilst there are no differences between the mean of C4 and C5 for financial, innovation and efficiency performance. Results outlined in Table 10 (E(4)) indicate that differentiator firms that use both TCS and BSC have greater customer performance than differentiator firms that use a combination of ABC and BSC ($p < 0.05$), whilst no differences were found for financial, innovation and efficiency performance.

Table 10: Planned contrast analysis results of the individual performances

Hypothesis	Source	Sum of squares	df	Mean square	F
Dependent variable: **financial performance**					
E1	contrast	0.02	1	0.02	0.02
	error	232.108	191	1.22	
E2	contrast	5.35	1	5.35	4.39**
	error	232.108	191	1.22	
E3	contrast	0.08	1	0.08	0.07
	error	232.108	191	1.22	
E4	contrast	0.05	1	0.05	0.04
	error	232.108	191	1.22	
Dependent variable: **customer performance**					
E1	contrast	0.00	1	0.00	0.00
	error	146.072	191	0.77	
E2	contrast	0.94	1	094	1.23
	error	146.072	191	0.77	
E3	contrast	6.51	1	6.51	8.51†
	error	146.072	191	0.77	
E4	contrast	3.29	1	3.29	4.30**
	error	146.072	191	0.77	
Dependent variable: **innovation performance**					
E1	contrast	1.72	1	1.72	2.97*
	error	110.574	191	0.58	
E2	contrast	2.14	1	2.14	3.69*
	error	110.574	191	0.58	
E3	contrast	3.90	1	3.90	6.73†
	error	110.574	191	0.58	
E4	contrast	0.02	1	0.02	0.04
	error	110.574	191	0.58	

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Dependent variable: **efficiency performance**					
E1	contrast	0.01	1	0.01	0.01
	error	270.806	191	1.42	
E2	contrast	3.01	1	3.01	2.12
	error	270.806	191	1.42	
E3	contrast	0.25	1	0.25	0.18
	error	270.806	191	1.42	
E4	contrast	0.26	1	0.26	0.18
	error	270.806	191	1.42	

* $p < 0.10$; ** $p < 0.05$; † $p < 0.01$

Discussion

The objective of the study was to contribute to the relationship between costing systems and performance management systems on organisational and individual performance improvement in an Australian context by testing four research hypotheses.

Hypothesis 1

Hypothesis 1 was formulated to determine whether there was significant difference between cost leader firms that use a combination of ABC and BSC, and those using both ABC and TPM in organisational performance.

Results of the planned contrast analyses showed that there was no significant difference in organisational performance between cost leader firms that use a combination of ABC and BSC, and cost leader firms that use both ABC and TPM ($F = 0.35$ and $p = 0.55$). H1 is not supported. This result is in contrast to what the literature inferred as cost leader firms seek to achieve above-average returns over competitors through low prices by driving all components of activities towards reducing costs. In addition, Porter (1985) suggested that cost leader firms should not ignore differentiation entirely. To attain this advantage, it was expected that by using a combination of ABC and BSC, rather than the singular use of ABC or BSC would provide greater performance for firms pursuing this type of strategy. In this way, the study proposed that the combination of a cost accounting system (e.g. TCS or ABC) and a performance measurement system (e.g. TPM or BSC) is contingent on the strategy the firm adopted in deciding whether to adopt cost leadership or differentiation strategies. This is particularly pertinent where the market environment is under competitive pressure, and management expects to improve the productivity and efficiency of the organisation, as well as enhancing organisational performance to survive.

Given the insignificant results of H1 and what has been mentioned in the literature about the benefits of using ABC and BSC to improve performance, further analysis was conducted to test H1 on each of the following individual performance items: financial performance, customer performance, innovation

performance and efficiency performance. Thus, these were labelled as equation 1 (E1) to match H1 and to distinguish between test of organisational performance and individual performance items.

The PCA confirmed that E1 (a), E1 (b) and E1 (d) are not supported by the mentioned equation. This means that there is no significant difference between cost leadership firms that use a combination of ABC and BSC, and those cost leadership firms that use both ABC and TPM for financial performance, customer performance and efficiency performance. However, the PCA found that E1 (c) was supported. Cost leadership firms that use a combination of ABC and BSC have greater innovation performance than cost leadership firms that use both ABC and TPM (F = 2.97 and p = 0.086). This means that cost leadership strategy is contingent on a combined use of ABC and BSC in improving innovation performance. This serves to reinforce the importance of the strong relationship between firms and their employees in understanding their employees' attitude, opinions, motivation and satisfaction. This aspect will lead to improved performance, since it shows the employee that their opinions and views are considered important. On the other hand, ensuring employees' satisfaction can greatly increase a firm's chances of successfully launching new products, as well as improving intellectual assets measurement, eventually resulting in improved performance.

Hypothesis 2
The PCA revealed that there was no statistically significant difference between cost leadership firms that use ABC and BSC, and cost leadership firms that use both TCS and BSC on organisational performance. Thus, the finding of H2 on organisational performance is not supported. This non-significant result is again in conflict with MAS literature. However, the MAS literature indicates a general consensus regarding the failure of cost accounting systems based on TCS[8] in meeting the requirements of businesses that operate in today's competitive markets (Cooper, 1990, 1989, 1988; Drury, 2000; Cooper & Kaplan, 1991, 1988). Ultimately, the information based on TCS leads to a distortion of product and service costs that can, in turn, mislead strategic decisions related to pricing, marketing, customer and profitability. In this regard, cost leadership strategy is characterised by cost control that aims to improve cost reduction including research and development, and advertising costs. Consequently, for firms that adopt this strategy, ABC is particularly suitable as a means to improve cost reduction and cost information for decision-making. However, this debate is not supported according to the results of H2. Again, additional tests of H2 were

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[8] This treatment is inadequate for overhead cost allocation and can result in cost distortions; especially in an organisation where a large proportion of overhead costs is higher than labour cost (Cooper, 1988).

conducted for each individual performance item to establish if there is any statistical significance. H2 was denoted as E2 to distinguish between testing organisational performance and individual performance items.

The PCA result reported that E2 (a) is significantly positive supported by the above equation. Thus, cost leadership firms that use a combination of ABC and BSC have greater financial performance than cost leadership firms that use both TCS and BSC (F = 4.399, p = 0.037). It can be inferred that improved financial performance can occur when a cost leadership firm combines the use of ABC and BSC. This finding is consistent with Olson and Slater's (2002) finding that high-performing, low-cost defenders place greater emphasis on the financial perspective than do low-performing ones. E2 (c) showed a slightly significant positive result for innovation performance (F = 3.692, p = 0.056). Therefore, cost leadership firms that use a combination of ABC and BSC will have greater innovation performance than cost leadership firms that use both TCS and BSC. This means that improved innovation performance can occur when a cost leadership firm combines the use of ABC and BSC. This is interpreted to mean that the benefits of using a combination of ABC and BSC will result in increased innovation performance in the form of increased employee satisfaction, number of new product launches, performance of innovation process, intellectual assets and number of new patents when firms focus on low-cost strategy rather than differentiation.

Maiga and Jacobs (2003) argued that the accuracy of cost information obtained by ABC can be viewed as a supportive measurement system for successful implementation of BSC. E2 (b) and E2 (d) were not supported, and consequently there is no difference for cost leadership firms that use a combination of ABC and BSC and those that use both TCS and BSC in improving customer and efficiency performance.

Hypothesis 3
The PCA confirmed that there was a slight difference between cost leadership firms that use a combination of ABC and BSC, and differentiator firms that use a combination of ABC and BSC on organisational performance (F = 2.74 and p = 0.10). This indicates that in today's Australian business environment, organisations try to maintain a balance between cost control and quality of their products and services. This makes it compatible with cost leadership strategy, indicating that customers' behaviour is more sensitive to the quality of products and services prices offered by today's firms. To achieve this aim, organisations need to use a combination of ABC and BSC. On the other hand, firms are aiming to build a competitive advantage by offering unique products and services that are characterised by features such as quality, innovation and customer service. This, in turn, is associated with differentiation strategy, and consequently organisations need to adhere to the BSC approach. Hoque and

James (2000) found that overall usage of BSC was significantly correlated with organisational performance. An additional test of H3 was conducted for each individual performance item to find out if there is any statistically significant divergence between them. H3 is denoted as E3 to distinguish between the test of organisational performance and individual performance items.

The PCA results show that E3 (b) is significant and positively supports the above equation. Consequently, cost leadership firms that use a combination of ABC and BSC will have greater customer performance than differentiator firms that use a combination of ABC and BSC (F = 8.507, p = 0.004). This indicates that improved customer performance is contingent on a combined use of ABC and BSC for cost leader firms. Thus, a combined use of an ABC system and BSC is associated with firms pursuing a cost leadership strategy to improve customer performance Included in the findings of Maiga and Jacobs' study (2003) was the inference that customer satisfaction is a significant function of the interaction between the BSC customer perspective and an ABC system. Porter (1985) also asserts that firms competing on low cost must ensure that their products are competitive.

The PCA results also revealed that E3 (c) was positively and significantly supported. This means that cost leadership firms that use a combination of ABC and BSC have greater innovation performance than differentiation firms that use a combination of ABC and BSC (F = 6.729, p = 0.01). Thus, improved innovation performance is contingent on a combined use of ABC and BSC for cost leadership firms. Involving and considering employees in the ABC implementation process can lead to greater success in ABC adoption and results in improvements in performance measurement systems, as well as conclusive enhancement of innovation performance. Among the findings of Maiga and Jacobs (2003) is the argument that quality product, customer satisfaction and margin on sale were significantly positive with interaction of BSC learning and growth perspective, and ABC. E3 (a) and E3 (d) were not supported. This can be interpreted to mean that there is no difference between cost leadership firms that use a combination of ABC and BSC, and differentiator firms that use a combination of ABC and BSC.

Hypothesis 4
The PCA results show that there was no significant difference between differentiator firms that use both TCS and BSC, and differentiator firms that use a combination of ABC and BSC. Thus, it can interpreted that there is no significant difference between differentiator firms that use both TCS and BSC, and differentiator firms that use a combination of ABC and BSC in improving organisational performance. Since a differentiator firm will have less focus on cost, it will benefit from using a BSC approach for improving organisational performance. On the other hand, the benefits of not using any system results in

greater performance for differentiator firms that use both, but not as great as differentiator firms that use only BSC. This debate was not supported by the H4 result. Given this statistically insignificant result for H4, the authors conducted further analysis to explore if there was any difference between each individual performance item. Thus, H4 is donated as E4 to distinguish between testing organisational performance and individual performance items.

The PCA result shows that E4 (b) was supported. Differentiator firms that use both TCS and BSC have greater customer performance than differentiation firms that use a combination of ABC and BSC (F = 4.297, p = 0.04). This means that customer performance is contingent upon the use of both TCS and BSC for differentiator firms. Shank (1989), and Lynch and Cross (1992) argued that firms emphasising differentiation strategies that use traditional accounting performance measures are unlikely to have sufficient evidence for assessing how production processes support a variety of customer-focused strategies. Further Maiga and Jacobs (2003) found that product quality, customer satisfaction and margin sales are significant positive functions of the interaction between BSC customer perspective and ABC.

Concluding comments

The results demonstrate that the combined use of ABC and BSC improve organisational performance, customer performance and innovation performance for cost leadership firms compared to differentiator firms. Cost leadership firms that use a combination of ABC and BSC have improved their innovation and financial performance more than those who singularly use ABC or BSC. Analysis also revealed that differentiator firms using TCS and BSC have improved customer performance compared with those who use a combination of ABC and BSC. It is concluded that customer, innovation, efficiency and organisational performance are contingent upon the type of strategy pursued when combined with the use of BSC. This study also supports Maiga and Jacobs's (2003) finding in relation to the interaction of BSC's innovation and learning perspective, and ABC on financial performance, as well as the interaction of the BSC's financial perspective and ABC on efficiency performance.

Several limitations of the research design used in this study should be mentioned. One limitation is the not abnormal limitation for the survey method wherein the biggest problem typically encountered is a low response rate (Neuman, 2003). Interpretation of the findings should be undertaken with caution due to the sample size, given that the nature of the study objective was to investigate three types of organisations: firms that use a combination of ABC and BSC; firms that use both the TCS and the BSC approach; and firms that use ABC and TPMs. The authors used several strategies to increase the response rate. Unfortunately, the majority of the participating firms use traditional

methods rather than ABC or BSC, and this is likely to have contributed towards the low response rate.

One of the interesting avenues of further research that has not been addressed in the scope of this study is to explore the impact of firm structural characteristics (e.g. decision structure, organisational structure and process/product integration) on the combined use of cost accounting systems and performance measurement systems in improving business performance. The contingency theoretical model used in this study examined strategy and organisational size as contingency factors in relation to costing systems and performance measurement systems. Further research in regard to other factors such as competitive environment, activity business type, notional culture and technology may increase understanding about how these factors are likely to impact upon the use of combined costing systems and performance measurement systems towards performance improvement.

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