

AN EXPLORATORY STUDY OF INNOVATION EFFECTIVENESS MEASUREMENT IN AUSTRALIAN AND THAI SMEs

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ABSTRACT

The advantages of using a balanced approach to measurement of overall organisational performance are well-known. We examined the effects of a balanced approach in the more specific domain of measuring innovation effectiveness in 144 small to medium-sized companies in Australia and Thailand. We found that there were no differences in the metrics used by Australian and Thai companies. In line with our hypotheses, we found that those SMEs that took a balanced approach were more likely to perceive benefits of implemented innovations than those that used only a financial approach to measurement. The perception of benefits then had a subsequent effect on overall attitudes towards innovation. The study shows the importance of measuring both financial and non-financial indicators of innovation effectiveness within SMEs and discusses ways in which these can be conducted with limited resources.

Keywords: Balanced Scorecard, Innovation effectiveness, Implementation, Performance measurement.

INTRODUCTION

Innovation is generally considered to be one of the key drivers of organisational success (Schillewaert, Ahearne, Frambach, & Moenaert, 2005). There is empirical evidence indicating that implementing innovations improves organisational performance. For example, a study of manufacturing companies in Australia and New Zealand showed that implementing total quality management practices in organisations increased organisational performance (as measured by percentage growth in sales, Terziovski & Samson, 1999). Yet, how can organisations be assured that implemented innovations *are* improving their performance? In this study, we examine ways in which organisations, and in particular, small to medium-sized enterprises, measure innovation effectiveness (using organisational performance as a distal measure of perceived benefits from innovation). We also consider the consequences of innovation effectiveness on attitudes towards future innovation adoption. We draw upon research in innovation and human resources to develop hypotheses regarding such measurement and its effects, and test these hypotheses in both Australian and Thai organisations. Throughout this research, we define innovation as “*a technology or practice that an organization is using for the first time, regardless of whether other organizations have previously used the technology or practice*” (Klein, Conn, & Sorra, 2001, p. 811). Because we examine multiple innovations, we define innovation effectiveness as the overall organisational outcome which results from implementing innovations. That is, how an organisation perceives the overall organisational improvement (including factors such as productivity, finance, employee morale) which arises specifically from implementing innovations (Klein et al., 2001).

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Small to medium-sized enterprises (SMEs) face a challenge in measuring innovation effectiveness. SMEs arguably require great innovation in order to remain competitive, as they lack the economies of scale of their larger counterparts (Fitzsimmons, Douglas, Antoncic, & Hisrich, 2005). In addition, they must generally do so with fewer resources. However, Woodcock, Mosey and Wood (2000) showed that SMEs often have no systems to track their performance during the innovation process. In this study, few relevant records existed in either paper or electronic format, preventing comparisons with the organisation's own previous efforts and/or those of competitors. Furthermore, when measurement does occur, SMEs tend to focus solely on financial indicators (Githeko, 1996).

Deciding how to 'keep score' is an important issue in innovation implementation and one that can strongly enhance the capabilities of SMEs. An effective performance measurement strategy can indicate the degree of success of implementation. However, the true nature of benefits from innovation may not be easily captured by traditional financial metrics alone and yardsticks for measuring innovation effectiveness should therefore extend beyond such financial measures (Cravens, 1998). This "balance" between financial and non-financial measures is often recognised in the performance measurement literature with regard to overall firm performance (e.g. Chiesa, Coughlan, & Voss, 1996; Griffin & Page, 1993; Hudson, Smart, & Bourne, 2001; Kanji & Sá, 2002; Kaplan & Norton, 1996a, 1996b; Verhaeghe & Kfir, 2002). However, it is not yet known whether balancing financial and non-financial indicators of innovation effectiveness is appropriate. This paper aims to quantitatively investigate how SMEs utilise various performance metrics to measure their innovations' effectiveness and the knock-on effects this choice will have on the company's overall attitude toward innovation.

Furthermore, this study will examine how these metrics are used across two cultures. Cross-cultural comparisons provide researchers with a valuable knowledge base to test the external validity and generalisability of their measures, theories, and models (Marsh & Hau, 2004). In order to gain insight regarding the applicability of our assumptions, the second aim of this study was to conduct a comparison of the innovation effectiveness metrics used by Australian and Thai organisations. It could be assumed that there are some major business culture and practice differences between Australia and Thailand. For example, previous research suggests that in Australia, quality is measured primarily in terms of achieving certain task-oriented goals, while in Thailand it is measured predominantly by technical indicators (Sheehan, 1996). Furthermore, performance measurement metrics of Thai companies are often reportedly guided by indicators such as "Value of the individual" (Tansuvan & Saeng-Xuto, 1992). Thai organisations also tend to consider productivity as encompassing not only financial performance but also human resource development and operations management (Thadasi, 1988). It seems that national culture, therefore, may affect how organisations select measures of innovation effectiveness, with Thai organisations seeming to have a greater appreciation of the value of non-financial indicators. We thus hypothesise that:

Hypothesis 1: Australian SMEs will use more finance-based metrics than non-finance based metrics, while Thai SMEs will use more of both finance and non-finance based metrics to measure innovation effectiveness.

APPLYING A BALANCED SCORECARD APPROACH

Empirical evidence is beginning to indicate that using a proper performance measurement strategy is critical to innovation evaluation (e.g Chiesa et al., 1996; Griffin & Page, 1993;

Hudson et al., 2001; Kanji & Sá, 2002; Kaplan & Norton, 1996a, 1996b; Verhaeghe & Kfir, 2002). A measurement system and an evaluation of measured performance were the critical success factors in the implementation of Statistical Process Control (SPC) in a study of 33 manufacturing SMEs in the UK (Rungasamy, Antony, & Ghosh, 2002). A longitudinal study of the Canadian steel industries also demonstrated that performance measurement systems improved the internal performance of these firms (Warrian, 2004).

Much of this work on performance measurement systems has tended to focus on financial indicators. However, non-financial indicators may also be important in assessing innovation effectiveness. The most commonly accepted performance metrics are those in the Balanced Scorecard (BSC) framework proposed by Kaplan and Norton (1996a). These authors reinforced the view that a balance between financial and non-financial measures is important to modern business:

“Managers should not have to choose between financial and operational measures...No single measure can provide a clear performance target or focus attention on the critical areas of the business. Managers want a balanced presentation of both financial and operational measures” (Kaplan & Norton, 1996a, cited in Ahmed & Zairi, 2006, p.361).

The Balanced Scorecard concept arose from the realisation that no single indicator can capture the full complexity of a unit's performance (Amaratunga, Baldry, & Sarshar, 2001). With regard to our study, we believe that this framework is more appropriate than a narrower financial approach because innovation effectiveness can be shown not only in financial improvements, but also non-financial indicators such as employee perspectives; internal processes; and/or customer satisfaction improvements (Adams, Bessant, & Phelps, 2006). We therefore align ourselves with those critics who argue that financial metrics alone do not capture the true benefits of innovation as thoroughly as a balance of financial and non-financial metrics (e.g. Ittner & Larcker, 1998).

The performance metrics examined in the current study are commonly used in business and fall into two major categories: financial and non-financial indicators. Finance-based metrics include measures such as costs, return on investment, profit margin, and sales growth; non-finance-based metrics cover areas such as customers (e.g. satisfaction and retention), internal processes (e.g. lead time, delivery, process time and productivity), and employees' learning and growth (e.g. development and knowledge). Using both financial and non financial measurements provides a sense of direction for performance improvement. A study of Acer Incorporated (a computer manufacturer based in Taiwan) suggested that using the BSC framework could capture all key aspects of Acer's performance (Wang, 2006). Likewise, a study of the aeronautical industry, one of the sectors in which technological innovation is of utmost importance, supported the fact that going beyond financial measurement would assist a firm to determine the benefits of innovation implementation (Díaz, Gil, & Machuca, 2005). This study suggested that organisations that used multiple indicators estimated greater benefits from implementation of Advanced Manufacturing Technologies (AMT) and would be more willing to invest in AMT implementation.

Given the above evidence regarding the breadth of potential innovation benefits, we argue that more “rounded” evaluations will be related to more positive perceptions of an innovation's effectiveness. Those organisations that use “narrow” evaluations will not be

capturing all of the innovation's benefits and therefore will have a less positive perception of the overall effectiveness of the innovation. Specifically, we hypothesise that:

Hypothesis 2: There will be a relationship between the innovation effectiveness metrics used (finance-based, non-finance-based, and balanced approach) and perceived innovation effectiveness; such that users of a balanced approach will perceive greater innovation effectiveness than those using finance-based or non-finance-based only.

THE RELATIONSHIP BETWEEN INNOVATION EFFECTIVENESS AND ATTITUDE TOWARD FUTURE ADOPTION

A positive perception of the benefits of implemented innovations will then also have knock-on effects to future innovations. Many innovation researchers (e.g., Damanpour, 1991; Frambach & Schillewaert, 2002; Lehman, Greener, & Simpson, 2002) have identified positive beliefs and motivational readiness as facilitators of implementing new innovations; much of this positive attitude will come from past experiences with innovation. Because implementing an innovation can be accompanied by risk, uncertainty, and expenditures of money, time and effort, organisations must perceive direct benefits from innovations to make them worthwhile (West, 2001). This suggestion is supported by a study of the implementation of organisational websites by 288 Chamber of Commerce members in the United States (Flanagin, 2000). This study suggested that the perceived benefit from technology was one of the best predictors of future adoption. Likewise, a survey of 298 companies in Hong Kong indicated that perceived benefit is positively related to attitude towards adoption (Au & Enderwick, 2000). Aligning with this previous literature, we propose that perceiving greater innovation effectiveness will correspond to a more positive overall attitude towards innovation. Accordingly, we posit that:

Hypothesis 3: There will be a positive relationship between perceived innovation effectiveness and organisational attitude toward innovation adoption.

The aims of the study, therefore, were fourfold: 1) To identify the types of measures used by Australian organisations to measure innovation effectiveness and their range of use across companies; 2) To compare this usage to companies in Thailand; 3) To examine the effects of choice of metrics on the perception of overall innovation effectiveness; and 4) To extend this relationship to its effects on the company's overall attitude toward innovation adoption.

METHODOLOGY

A survey was mailed to the CEO or Managing Director of each organisation. The aim of this questionnaire was to discover what kind of performance measurement indicators Australian and Thai companies used to capture innovation effectiveness, and how they perceived the organisational improvements gained by the implementation of the innovation. The research instrument for the study was discussed with five academic experts and practitioners drawn from four different areas: innovation management, organisational psychology, industrial engineering, and industrial consultancy. Based on feedback, minor changes were made to the instructions and wording of items to ensure clarity and ease of use.

Samples

A sample of 1,398 firms was randomly selected from client databases of industry partners in Australia (QMI Solutions) and Thailand (Thailand Productivity Institute). The sample was

based mainly in Queensland, Australia and Bangkok, Thailand. A total of 144 completed questionnaires were returned (11% response rate). Of these, 58 questionnaires were returned from the Australian population (7.8% response rate) and 86 questionnaires were returned from the Thai population (10.8% response rate). A total of 75 surveys were usable for this study. Chi-square comparisons between the Australian and Thai samples showed that the only significant differences were gross revenue and size. Most (57.4%) of the Australian respondents had gross revenue during 2003-2004 of less than 10 million AUD, while most (67.1%) of the Thai respondents had gross revenue for the same period of between 1.8 and 6.66 million AUD ($\chi^2(5, N=75) = 48.55, p < .001$). In Australian SMEs, most (61.4%) had less than 50 employees, while most Thai SMEs (72.9%) had less than 200 employees ($\chi^2(5, N=75) = 51.53, p < .001$). There were no significant differences in industries between the two samples. The majority of both Australian and Thai respondents were in the manufacturing industry (81.4% and 63.6%, respectively). A further 12.4% of the Australian sample, and 9.7% of the Thai sample, were in the automotive industry. The remaining respondents were in other industries (e.g. construction, pharmaceuticals and telecommunications).

Measures

All Australian measures were administered in English. The translation of the questionnaire into the Thai language was accomplished through a two-stage translation/back-translation procedure. First, the first author translated the questionnaire from English into Thai. The Thai version was then back-translated into English by a bilingual volunteer, who was not aware of the purpose of the study. Following this, the original questionnaire was compared with the back-translated English version, and differences resolved through discussion. This process ensured an accurate translation of the original English language version of the questionnaire.

Innovation Effectiveness. This measure indicates an organisation's realisation of the intended benefits of a given innovation (e.g. improvements in productivity, customer service, and morale, adapted from Klein et al., 2001). The 10 items described the effects of innovation implementation on the organisation as a whole and on individual job performance. Using a five-point Likert scale (from 1 = Made much worse to 5 = Greatly improved), the CEO or Managing Director rated the effect the innovations that they introduced in the last three years had on these aspects (e.g. productivity; management-employee relations; product/service diversity; customer satisfaction; quality).

Performance Metrics. The set of 15 performance metrics was generated from relevant prior research (Ahmad & Dhafr, 2002; Bremser & Barsky, 2004; Luria & Wiarda, 1996). These metrics are commonly used in business and fall into two categories: 1) finance-based, such as return on investment; and 2) non-finance-based, such as customer retention, productivity, and employee development. Respondents were asked whether their organisation used these metrics to measure innovation effectiveness. Because some respondents may report using these metrics to measure innovation effectiveness but may not actually use them, we employed a technique designed to decrease social desirability effects. To ensure accurate reporting, participants were also asked to identify the actual measurement systems used to collect information on each metric. For example, respondents who reported that they measured employee morale may mention a measurement record system such as an employee survey as the tool used to obtain this information. Only respondents who reported the actual measurement system used were included in the study.

Attitude toward future innovation adoption. This represents an organisation's view of innovation. The four items represent general attitudes regarding innovation adoption (e.g. "We consider our organisation to be innovative", "Our organisation continually adopts new and improved ways to work"). Respondents provided ratings on five-point Likert scales (from 1 = Not at all to 5 = A great deal). Cronbach's alpha was .63.

RESULTS

Preliminary analysis showed that 79.5% of Australian SMEs and 75.5% of Thai SMEs reported using both financial and non financial metrics to measure their innovation effectiveness. A further 17.7% of Australian respondents and 12.2% of Thai respondents reported using only financial metrics to measure innovation effectiveness. Results also indicated that 2.9% of Australian SMEs and 12.2% of Thai SMEs reported using only non-financial metrics. Examination within the Australian sample found that the three most commonly used metrics were: 1) customer satisfaction (non-financial metric); 2) sales and sales growth (financial metric); and 3) return on investment¹ (financial metric). The three metrics that were most highly used among the Thai sample were 1) product/service quality (non-financial metric); 2) sales and sales growth (financial metric); and 3) profit margin (financial metric).

Although the sample size was limited, Eta squared (η^2), a measure of effect size, from our study ranges in value from .06-.19 indicating medium to large effect sizes. Cohen (1988) indicates guidelines for small (0.01), medium (0.06), and large (0.14) effect sizes, suggesting that this data represents a substantive population.

Hypothesis 1: Cross-cultural differences in metric utilisation

A chi-square test was conducted to assess whether there were significant differences between the Australian and Thai sample on the use of financial and non-financial metrics. Contrary to our hypothesis, the results of the test were non-significant ($\chi^2(2, N=75) = 2.40, ns$) suggesting that there are no differences between Australia and Thailand in the use of metrics for measuring innovation performance. Possible explanations for this non-significant result and future recommendations will be provided in the discussion section. Given that these two samples were not significantly different, the following examination will treat both groups as one sample and include nationality as a covariate.

Hypothesis 2: Effects of metrics on perceived innovation effectiveness

Examination of mean differences between organisations that used solely finance-based metrics, solely non-finance-based metrics, and a combination of metrics are shown in Figures 1.1 (Australian vs. Thai sample) and 1.2 (combined sample).

A series of analysis of covariance analyses (ANCOVA) was conducted with nationality as a covariate to evaluate the relationship between the use of measurement metrics and the perceived effectiveness of innovation (see Table 1). The independent variable, the use of measurement metrics, included three levels: the use of solely financial metrics, the use of solely non-financial metrics, and the use of a combination or balanced approach. The dependent variable, innovation effectiveness, included 10 different aspects of effectiveness (e.g. financial performance, customer satisfaction). There were three aspects in which significant mean differences were found between groups that used different metrics.

ⁱ Same weight as sales and sales growth

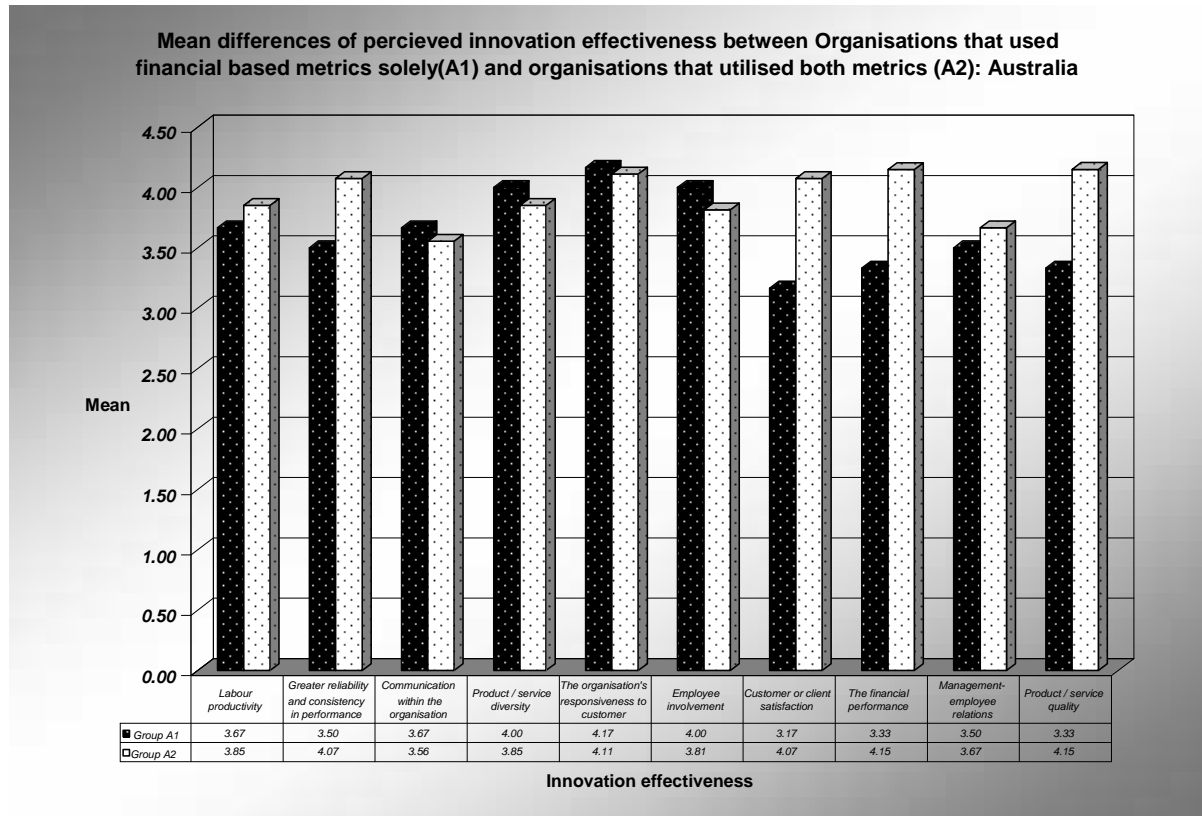


Figure 1.1 Mean Differences in Perceived Innovation Effectiveness (by Country and Metrics Utilised)

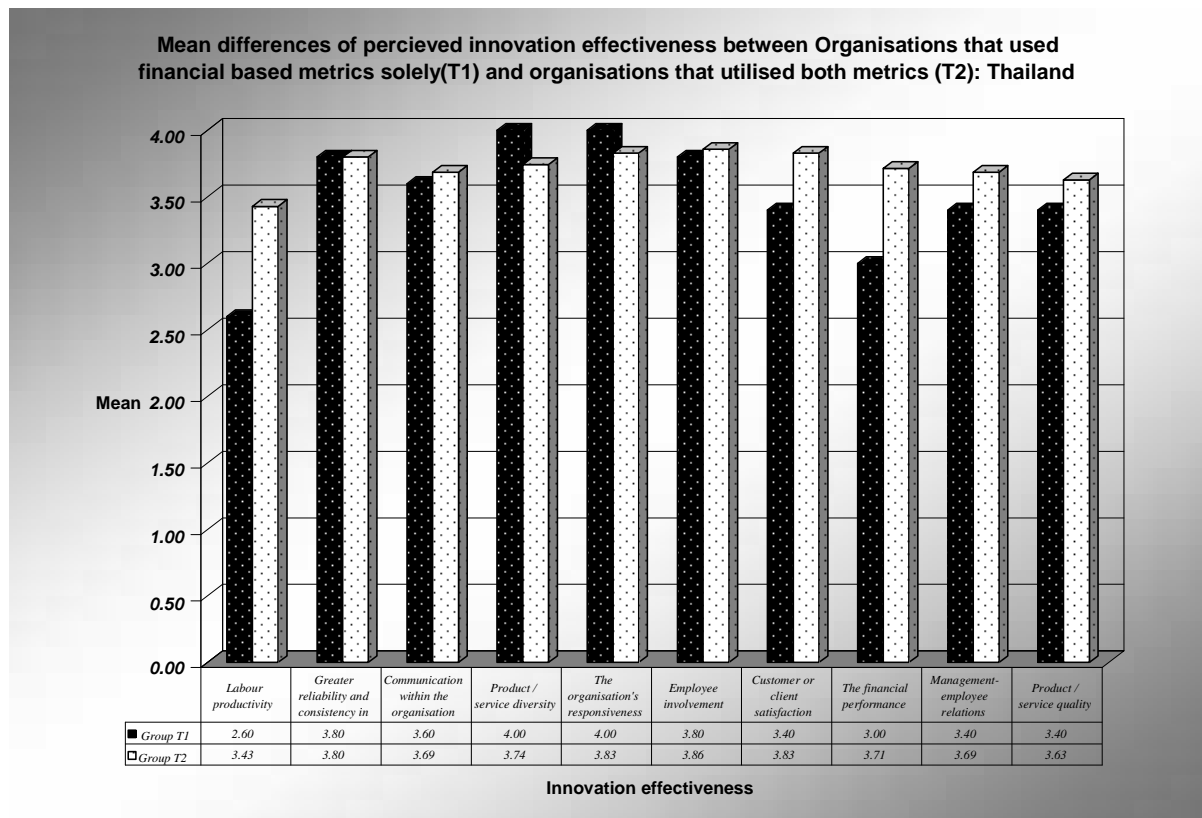


Figure 1.2 Mean Differences in Perceived Innovation Effectiveness (by Metrics Utilised—Combined Sample)

Table 1
Summary of ANCOVA results when nation appears as a covariation

Dependent variables	Independent variable	Mean	F	Mean differences
Customer satisfaction	1.Finance based	3.25	F (3, 71) = 4.31, $p < .01$	Finance and Balance approach
	2.Non finance based	3.95		
	3.Balance approach	3.70		
Financial performance	1.Finance based	3.14	F (3, 71) = 5.17, $p < .01$	Finance and Balance approach
	2.Non finance base	3.65		
	3.Balance approach	3.43		
Product/service quality	1.Finance based	3.32	F (3, 71) = 6.20, $p < .01$	Finance and Balance approach
	2.Non finance base	3.87		
	3.Balance approach	3.78		

Customer satisfaction. The ANCOVA was significant, $F(3, 71) = 4.31, p < .01$. Follow-up tests were conducted to evaluate pairwise differences among means. A Bonferroni post-hoc procedure revealed that, in line with our hypothesis, organisations that used solely finance-based metrics to evaluate innovation effectiveness perceived less benefit to customer satisfaction ($M = 3.27, SD = .98$) from the innovation than organisations that utilised both financial and non-financial metrics ($M = 3.96, SD = .65$). There were non-significant pairwise differences in perceived customer satisfaction between organisations that used non-financial metrics and those with a balanced approach.

Financial performance. The ANCOVA was significant, $F(3, 71) = 5.17, p < .01$. Bonferroni post-hoc analysis showed that organisations that used solely finance-based metrics to evaluate innovation effectiveness perceived less benefit to financial performance ($M = 3.18, SD = .98$) from the innovation than organisations that utilised both financial and non-financial metrics ($M = 3.96, SD = .75$). Again, there were no significant pairwise differences in reported effects on financial performance between organisations that used non-financial metrics and those that used a balanced approach.

Product/service quality. The ANCOVA was significant, $F(3, 71) = 6.20, p < .01$. Bonferroni post-hoc analysis showed that organisations that used solely finance-based metrics to evaluate innovation effectiveness perceived less benefit to product or service quality ($M = 3.36, SD = .67$) from innovation than organisations that utilised both financial and non-financial metrics ($M = 3.88, SD = .57$). There were no significant pairwise differences between organisations that used only non-financial metrics and those with a balanced approach.

Table 2
Bivariate and Partial Correlations between Innovation Effectiveness and Attitude toward
Innovation Adoption

	Variables	Labour productivity	Greater reliability and consistency	Product/service diversity	The organisational responsive to customer demands	Customer satisfaction
Bivariate Correlation	Attitude toward innovation adoption	.30**	.25*	.28*	.44**	.35**
Partial Correlation	innovation adoption	.23*	.22*	.27*	.39**	.34**

** $p=.01$; * $p=.05$

Hypothesis 3: Relationship between perceived innovation effectiveness and attitude towards future innovation adoption.

To examine the consequences of positive perceptions of innovation effectiveness, correlations between the 10 innovation effectiveness aspects and overall attitude toward future innovation adoption were computed. The results of the correlational analyses presented in Table 2 show that five aspects of innovation effectiveness (labour productivity; greater reliability and consistency in performance; product/service diversity; organisational responsiveness to customers; and customer satisfaction) were significantly related to attitude towards future innovation. These results suggest that if an organisation perceives benefits in those five aspects of innovation effectiveness, the organisation's overall attitude toward future innovation adoption will also be more positive.

Partial correlation coefficients were computed among these five aspects of innovation effectiveness and attitude toward future innovation adoption, again controlling for nationality. The partial correlations are reported in the second half of Table 2. The results indicate that attitude toward future innovation adoption was significantly positively correlated with these five aspects of innovation effectiveness. In fact, the correlation coefficients are similar to the zero-order correlation coefficients. Thus, nationality does not influence the relationship between these five aspects of innovation effectiveness and attitude toward future innovation adoption in this sample.

DISCUSSION

Measuring the benefits that an innovation imparts to an organisation is an important tool in understanding whether or not innovation has been successful. Applying a Balanced Scorecard approach does affect how organisations perceive the benefits from innovation implementation. Furthermore, perceiving positive benefits from innovation implementation is positively related to attitudes to future innovation adoption.

We found that national culture did not significantly influence the choice of innovation metrics across Australian and Thai SMEs. There are a number of powerful reasons why the influence of national culture might not be noticeable as is commonly assumed. Perhaps the rise of innovation has created a new "cultural region" where extant national cultural classification schemes, such as eastern and western dimensions, cannot be applied. Increasing globalisation may also lead to cultural shifts, perhaps particularly in areas of enforced novelty such as innovation, as the cultural values of countries are subject to change (Hofstede, 1984). Therefore, this result may not devalue the contribution of this research, but may in fact

influence future research to view culture as having aspects beyond the country dimension in fields such as innovation.

Contrary to our hypothesis, Australian SMEs were as likely (79.5%) as Thai SMEs (75.5%) to use a balanced approach. Interestingly, more companies in both Australia and Thailand used a Balanced Scorecard approach to measuring innovation effectiveness than a more narrow finance-based or non-finance-based approach. The widespread acknowledgement of a balanced approach to organisational performance measurement more generally may be influencing the companies' approach to the more specific innovation effectiveness measurement system. It could be that SMEs are aware of the shift in the academic and business literatures towards a balance of financial and non-financial indicators. However, there was still a large proportion (24.5%) of organisations that did not use a balanced approach. It might also be the case that some SMEs do not have the resources to implement a balanced approach to measuring innovation effectiveness. Future research will need to examine why many SMEs do not use a balanced approach to measurement, and how that deficiency can be rectified.

It was hypothesised that there would be a relationship between the innovation metrics used (finance-based, non-finance-based, and balanced approach) and perceived innovation effectiveness. Our hypothesis was supported for three of the effectiveness criteria: customer/client satisfaction, financial performance, and product/service quality. Organisations that used a balanced approach perceived higher benefits in those three aspects of effectiveness than users of finance-based metrics. Although there were no significant differences on the other criteria, the confluence of our results with that of the general performance measurement literature suggests that companies who used the balanced approach perceived more benefits than those who used only the financial approach. Nevertheless, this study represents only a small step forward in our understanding of the effects of performance measurement in innovation effectiveness and further research is needed to replicate and extend these findings.

The largest mean difference arose in the area of customer/client satisfaction. This criterion appears to be an important consideration as it also influences the company's attitudes to innovation. However, traditional performance measurement strategies, which generally consider only an organisation's internal perspective, are less able to capture the effects of innovation on this area. This has potentially far-reaching implications for future innovation adoption. Without the proper measurement, organisations are not able to obtain customer feedback precisely, and if companies do not recognise these benefits, they may be less likely to implement future innovations. A balanced approach to measurement is able to capture a wide range of data that can more fully depict the effects of the innovation on customer satisfaction. By using only financial metrics, organisations may not be receiving information about the effects of the innovation on their customers. For example, if an organisation promotes a new service to a client, the manager may expect customer satisfaction to increase, and that this will correlate with an increase in sales. However, if the customer likes the new service but does not have immediate cash-flow, this assumed correlation will not exist. If the organisation only measures the sales figures they will not see the expected increase; the perception will be that the innovation was not effective in increasing customer satisfaction. On the other hand, if the company employs a balanced approach to capture the improvement, they will correctly identify that customers are pleased with the new service, and that future financial benefits may follow.

Interestingly, organisations with a balanced approach also perceived greater benefits to financial performance than those organisations that utilised only finance-based indicators. Perhaps SMEs that consider both financial and non-financial measures of effectiveness may be better able to also appreciate the indirect financial benefits of innovation.

Anecdotal evidence from SMEs visited by the authors suggests that many organisations recognise the importance of gathering a balanced range of information to ascertain customer perceptions. However, having an information collecting system (such as conducting customer surveys or market research) may be costly and time consuming for SMEs. This may influence some companies to simply exclude customer satisfaction or retention as an indicator of organisational improvement, or to rely on staff perceptions or “gut feel” for these factors. One alternative suggestion for SMEs with resource limitations who wish to directly assess the customer’s views is to implement a web-based feedback form. Customers can spend time at their convenience and fill out the form or provide comments through a web site.

Our research found that when organisations perceived that the innovation was effective in a number of areas, they had a more positive attitude toward innovation adoption. This finding, while novel in the field of innovation in SMEs, is indicative of the knowledge within social and cognitive psychology regarding attitude formation. Much research over the past decade has shown that our attitudes are often based on previous experiences (e.g. Anderson, Hodge, Lavalley, & Martin, 2004; Jacoby, Gorry, & Baker, 2005; Poortman & van Tilburg, 2005). In the field of innovation, however, the finding has further implications. The Innovation Theory of Planned Behaviour (I-TPB, Unsworth, Brabant, Murray, & Sawang, 2005) suggests that an organisation’s positive attitudes towards an innovation will promote the likelihood of new adoptions in the future. Thus, those that perceive greater benefits from an implemented innovation are more likely to have positive attitudes towards innovation, which may lead to further innovation adoption.

The implications of our study, then, are clear. We have shown that measuring a balanced set of metrics is related to more positive perceptions across various criteria of innovation effectiveness than measuring only financial indicators. This perception of innovation effectiveness not only allows a company to have a more “valid” perspective on the benefits being gained by the innovation, but also engenders a more positive attitude towards innovation adoption and implementation, thereby encouraging further innovation.

Of course, the study is not without its limitations. Self-report measurement techniques have inherent limitations. In this study, organisations reported how much benefit they perceived from innovation implementation. There are several reasons that organisations may inflate these reported figures. Organisations may not have appropriate data to use as a baseline (due to the use of purely financial metrics), and therefore may simply ‘assume’ the benefits they gain based on financial figures. Also, the companies may fear losing face if they report few benefits. Although the survey was anonymous, this concept is a strong part of the Asian culture. Hwang, Ang and Francesco (2002) discuss the emergence of a new cultural attitude, *kiasuism*, with roots in the Chinese concept of face. The term *kiasu* literally means “afraid to lose” in the Chinese Hokkien dialect. This may explain why some organisations who used financial metrics alone reported similar benefits from innovation to organisations that used a balanced approach. Future research can overcome this issue by examining objective benefits, such as recorded performance, as well as subjective or perceived benefits. Nevertheless, Well

and Olson (1989) found that self-report performance figures provided by managers were strongly correlated with the actual objective measures. This provides some support for the validity of our study, which represents a small step forward in our understanding of this area.

A further limitation to this study is its small sample size and response rate. Only 11 organisations in this sample used solely financial metrics, compared with 64 organisations that used a balanced approach. This could influence p values and explain why hypotheses relating to some aspects of innovation effectiveness (e.g. communication) were not supported. Future research should increase power through a larger sample size in order to properly test the hypotheses and increase the response rate to minimise any potential response bias.

Testing these results in different countries will provide researchers with valuable knowledge about the external validity and generalisability of this study. We recommend researchers replicate this study in different countries. Future research should also focus on longitudinal studies across a range of different countries to understand how innovation benefits change over time, and how different performance measures may capture those changes.

IMPLICATIONS

Previous research has often shown that organisations fail to perceive potential benefits from implementing innovations (e.g. lean production, customer relationship management, enterprise resource planning, rapid prototyping, Dennis, 2003). However, rather than dismissing these innovations out of hand, it may be that the organisations were simply not capturing these benefits by using only traditional, finance-based, performance measurement systems. It is therefore critical, for both companies and for academics, to ensure that balanced performance metrics are being used to ascertain an innovation's effectiveness.

This balanced approach to measuring innovation effectiveness may be a critical discipline for managers (Sawang & Unsworth, 2006), but it is also a challenging one. Financial metrics are often relatively easy to obtain. However, some non-financial metrics that allow for a balanced approach, such as communication, employee involvement, or management-employee relations, are much more difficult. Nevertheless, our research has shown the importance of collecting this information. Communication can be measured through integration mechanisms such as number of meetings and contacts (Damanpour, 1991). An employee survey is also a good source of information such as employee involvement as well as management-employee relations. From our experience of visiting and interviewing several SMEs, we found that the majority did not collect employee data. As noted earlier, we recommend organisations get feedback from both internal customers (employees) and external customers (clients/suppliers).

Managers, particularly in small business, may assume that collecting data beyond sales or profit indicators is demanding on company resources. However, the movement to apply a balanced approach would not require major additional resources. Managers, employees and customers of small organisations generally have frequent face-to-face contact. This has a potential advantage in that it is possible to collect information or data around both financial and non-financial performance. Furthermore, organisations may already collect non-financial data, but not link them to organisational improvements. A recent study of 75 manufacturing firms indicated that although over half of the firms measured non-financial measures such as rejection rates, only 16% of these (12 firms) used the data to justify operational performance (Davig, Elbert, & Brown, 2004). Thus, managers may explore whether an existing record system can be used to measure innovation effectiveness.

Innovation often requires substantial monetary investment, and SMEs expect strong returns to justify this investment. However, these returns should be considered as more than simply a dollar value. Although financial metrics such as return on investment and sales growth are important to organisational performance, these measures alone are incapable of capturing the full effect of innovations on economic performance because they are concerned primarily with maximisation of stockholder's wealth and ignore other stakeholders' interests (Mahmood & Mann, 1993). We recommend organisations take care to use a balanced approach, utilising both financial and non-financial metrics, to capture the full range of potential benefits from implementing innovations.

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