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Intellectual capital, management accounting practices and corporate performance

Perceptions of managers

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Abstract

Purpose – The purpose of the paper was to examine whether, and in what way, managers perceive that the level and shape of intellectual capital (IC) within firms influences management accounting practice, specifically, performance measurement, planning and control, capital budgeting, and risk management. It also explores whether such firms are better able to respond to unanticipated economic and market changes and achieve relatively higher performance within their sector.

Design/methodology/approach – The paper is based on the results of a study conducted in Malaysia through a questionnaire survey in 119 large companies with varying levels of IC and selected interviews with both accounting and non-accounting executives in a subset of them.

Findings – The findings in the paper suggest some evolution in management accounting practices for firms investing heavily in IC. The findings are discussed and further explored through interviews in some of the firms analysed.

Research limitations/implications – The limitations of survey research in this paper are acknowledged, however these are ameliorated by confirmatory insights from the interviews. Further research could be carried out using more extensive case studies in companies, perhaps longitudinally, or undertaken using sector focused surveys.

Practical implications – It is important to show in the paper that management accounting systems reflect the strategic orientation of the companies concerned. Where a greater focus on intangibles and intellectual capital occurs it may require a different emphasis on management accounting practices compared to companies where they do not feature strongly. It is important that management recognise and act on this in order to improve corporate performance.

Originality/value – The paper shows that it is widely recognised that (IC), whether in the form of knowledge, experience, professional skill, good relationships, or technological capacity is a major source of corporate competitive advantage. Whilst the literature places considerable attention on the valuation, measurement and reporting of IC for external reporting purposes, far less attention has so far been given to the implications of IC for managerial accounting practice. This paper addresses this omission.

Keywords Intellectual capital, Management accounting, Malaysia

Paper type Research paper

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Introduction

The economic development currently experienced by much of business is characterised by continuous innovation, the spread of digital and communication technologies, the

relevance of network forms of organisation, and the prevalence of soft, intangible and human factors in organisations. Firms operating within this so-called Intangible Economy derive much of their wealth from intellectual capital (IC) where the real competitive edge is located in the quality of relationships, structures and people (Segelod, 1998). Knowledge creation, articulation, processing and leveraging have become a central value-creation activity for modern enterprises (Wiig, 1997).

As managers become more aware of the role played by intangibles in generating profitable business, new demands are being imposed on management accounting to capture, measure and report IC value and performance (Marr and Chatzkel, 2004). If, as Edvinsson and Sullivan (1996) argue, knowledge-driven firms derive their profits from innovation and knowledge-intensive services, knowledge management requires knowledge measurement. In this paper we call such knowledge-driven firms "high IC firms". In contrast, "low IC firms" do not create and deploy knowledge intensively and value creation is not dependent upon superior knowledge, structures and relationships.

The IC literature in accounting is varied but mainly addresses external reporting (e.g. Bukh *et al.*, 2001; Guthrie, 2000 and Mouritsen *et al.*, 2001a). External financial statements offer very limited information on intangibles (Financial Accounting Standards Board, 2001; Wallman, 1995). Some have argued that capital markets require more reliable information regarding corporate knowledge resources such as strategic direction, risk factors, experience, integrity and managerial qualities (Eccles *et al.*, 2001) and this is in part being met by intellectual capital information provided through private channels such as presentations to analysts (Holland, 2003; Garcia-Meca *et al.*, 2005).

Management therefore needs to identify, measure, and communicate the value drivers expected to improve information systems, performance measures and resource allocation for investors (Ittner and Larcker, 1998). This suggests that organisations with strong levels of IC should have developed management accounting and control systems that support such endeavours. The theoretical argument that disclosure of value content information on IC reduces transaction costs and uncertainty, and hence mitigates adverse selection problems have been employed in relation to voluntary disclosures to investors (Diamond and Verrechia, 1991; Lev, 1992; Botosan, 1997; Healey *et al.*, 1999; Leuz and Verrechia, 2000). These very same agency arguments apply within the firm. Management accounting control systems should have evolved to address such issues. However, as Roslender and Fincham (2001) observe, there is very little empirical academic literature on how management accounting handles intellectual capital and the practitioner-oriented literature has become repetitive.

This paper explores whether, and if so how, firms with high levels of IC have developed their management accounting practices to address the issues that accounting for IC promotes. It has been argued that accountants in such firms should adopt a more strategic management accounting approach and focus on the evaluation, appraisal, and measurement of IC to avoid neglecting the organization's most valuable resources (Tayles *et al.*, 2002). However, it is unclear just what role management accounting plays in relation to IC management in high IC companies. The paper examines how management accounting practices evolve as organizations adapt their management strategies and practices to reflect the growing knowledge-based

economy. Second, we consider whether high IC firms are more responsive to unanticipated economic events and achieve higher relative performance levels.

The next section of this paper reviews the intellectual capital literature and its relevance to management accounting and control. We then describe the research method and data analysis. The summary results are presented and discussed next. Finally we summarise the implications of our research and potential areas for further research are identified.

Literature review

Intellectual capital (IC)

Intellectual capital (IC) has been defined by Klein and Prusak (1994) as "packaged useful knowledge". It basically constitutes knowledge, lore, ideas and innovations (Sullivan, 2000).

While earlier writers may not agree on the precise definition of IC, there is broad consensus that it contains human capital, structural capital and relational capital (Bontis, 1998; Edvinsson and Malone, 1997; Edvinsson and Sullivan, 1996; Lynn, 1998; Roos *et al.*, 1997; and Stewart, 1991, 1997). Human intellectual capital (HIC) captures the knowledge, professional skill and experience, and creativity of employees. Structural intellectual capital (SIC) consists of innovation capital (intellectual assets such as patents) and process capital (organisational procedures and processes). Relational intellectual capital (RIC) captures the knowledge of market channels, customer and supplier relationships, and governmental or industry networks. Thus, IC is the possession of knowledge and experience, professional knowledge and skill, good relationships, and technological capacities, which when applied will give organisations competitive advantage (CIMA, 2001).

Taking an ownership perspective two major components of IC are human capital and intellectual or intangible assets. Whilst human capital cannot be owned by companies, innovations produced through human capital can be transformed into intellectual assets to which they have rights of ownership (Abeysekera and Guthrie, 2004), though this process is inevitably extremely complex to measure and manage. Its importance was recognised in the Danish contribution to the Meritum Project (Meritum, 2002), which emphasised that people provide the business competence, customer relations, etc., which develop innovations and ensure competitive advantage. Encouraged perhaps by the early work of Sveiby (Invisible Balance Sheet) and the Intangible Asset Monitor, companies have endeavoured to focus on HIC and develop performance measures. The call for accounting measurement seeking to track the development of IC elements from HIC through RIC and SIC is strong.

A useful contribution to the discussion of this challenge is provided by Johanson *et al.* (2001) who point out the important part that accounting approaches to IC play in most companies, particularly through the application of rules and routines. This involved greater attention to the incorporation of HIC related items in the balance sheet and profit and loss account. They also found greater attention to the formalisation of measurement practices, thus: "making 'tacit' knowledge about norms (search rules) and activities (routines) explicit and thereby more easily communicated" (Johanson *et al.*, 2001, p. 729). The counter argument is that there is too much measurement of these issues and that narratives are more appropriate than accounting numbers

(Roslender and Fincham, 2004) pointing to potential conflicting interests and ethical tensions.

Intellectual capital management (ICM) is the "direction" of the value-driven transformation of human and relational capital into the structural capital of the organisation (Lynn, 1998). Corporate processes (e.g. recruitment, training and compensation) help foster creativity and innovation. Together with appropriate technology and structural capital they create and share organisational knowledge which, when exploited and applied to external knowledge and relational capital produces corporate competitive advantage. The outputs of knowledge management are innovations or intellectual assets. Intellectual assets such as patents and trademarks are normally legalised in order to obtain legal, propriety rights upon them, producing intellectual property. Together with structural capital (technology, procedures, processes, etc.), tangible assets and relational capital they are managed to create profitable new products and services. ICM therefore converts IC into intellectual assets, which, when commercialised increases corporate value (Roos *et al.*, 1997; Edvinsson and Malone, 1997; Edvinsson and Sullivan, 1996; Webster *et al.*, 2004).

Accounting research into IC has followed various directions, for example, Grojer and Johanson (1998) remind us that some aspects of accounting for IC may have originated in human resource costing, which seems to have experienced reduced focus in recent decades. The dormant nature of this is also referred to by Roslender and Fincham (2001) in their critical thinking on IC, when they pose the question what form accounting for IC should take. Dealing with matters external to the firm Stolowy and Jeny-Cazavan (2001) address the setting of standards for financial reporting of intangibles, in relation to which Holland (2003) contrasts a more market-based approach, when data is used by institutional fund managers. Related to this topic, Amir *et al.* (2003) have undertaken a quantitative analysis focusing particularly on R&D. Bukh (2003) comments on the need for firms' disclosure on IC to be part of the framework of value creation processes within the firm in order to be seen as relevant by the capital market, whilst a method to develop a latent index to proxy performance elements of human capital assets has been developed proposed by Abdel-Khalid (2003).

Collier (2001) points out that the intellectual capital of an organisation may be different from its intellectual capacity, contrasting a flow rather than stock approach. Mouritsen *et al.* (2001b) develop some of this in their report of numbering, visualisation and narratives in the accounting for IC at Skandia. Van der Meer-Kooistra and Zijlstra (2001) in reviewing IC reporting models convey their experiences of IC accounting in some Danish companies also drawing attention to the audit complexity that may apply in some aspects of reporting. Acknowledging that the antecedents of today's intellectual capital movement lie in practice, Petty and Guthrie (2000) suggest it is desirable that researchers keep their work focussed on business practice. A point supported by the work of Chaminade and Roberts (2003) in implementing intellectual capital reporting systems in Norway and Spain. Related to this Guthrie *et al.* (2001) point to two IC "missions" on which this paper throws some light, being systems for creating, capturing and disseminating IC and measures and ways of reporting value attributable to IC within organisations. Tayles *et al.* (2002) have some suggestions on this latter point on which this paper offers an empirical contribution.

In the rest of this section we examine a number of management accounting practices (MAPs) and suggest from the contemporary literature how high IC firms may be

expected to develop such practices. Arguably, the decision to become IC intensive is strategic, whether emergent or deliberate. We have placed emphasis therefore on MAPs, which have a strategic orientation, with a particular focus on performance measurement, management control and decision-making. This is in line with the attempts of some writers to contribute to a conceptual framework of strategic management accounting (Tomkins and Carr, 1996, Guilding *et al.* 2000). These are the topics areas on which other writers in the Knowledge Management and Intellectual Capital field have also placed focus, for example, Mouritsen (1998), Tayles *et al.* (2002) and Mouritsen and Larsen (2005).

Performance measurement

Strategy is a pattern of resource allocation that enables a firm to maintain or improve performance that creates "fitness" among a company's activities. Simons (1990) observes that performance measurement is tracking the implementation of business strategy by comparing actual results against strategic goals and objectives. As performance is a result of an activity (Porter and Millar, 1985) performance must be measured in order to analyse strategies. Performance measurement is perhaps the most important, yet most misunderstood and most difficult, task in management accounting (Atkinson *et al.*, 1995). Neely (1998) suggests that performance measurement "is the process of quantifying past action".

Traditional accounting performance measurement employs financial techniques such as Return on Assets (ROA) and Return on Capital Employed (ROCE). These have been criticised for being backward looking, unable to measure intangible resources and not suitable for assessing performance of investments in new technologies and markets which firms require to compete successfully in global markets (Bourne *et al.*, 2000; Amir and Lev, 1996).

Recent years have witnessed a move towards financial measures, such as Economic Profit type measures[1] which are more closely linked to shareholder value (O'Hanlon and Peasnell, 1998). These performance measures yield the same discounted present values as free cash flow, thereby retaining the focus of accounting profit on the matching of costs and revenues without losing value-relevance. Value relevance of Economic Profit is achieved by the numerous adjustments to conventional financial reports to reflect hidden assets such as intangibles and long-term investments. There is a high degree of uncertainty in intangibles and long-term investments, such as capitalisation and amortisation of R&D, market building, restructuring charges, and other strategic investments with deferred pay off patterns (Barsky and Bremser, 1999; Simons, 1990). Thus Economic Profit has been advocated as an appropriate IC performance measure.

In the early 1990s, various performance measurement frameworks were developed, to overcome the weaknesses of financial-only measures (Bourne *et al.*, 2000). Such models place greater focus on intangible resources (Amir and Lev, 1996) such as key customers, internal processes and learning, (Simons, 1990). Commonly used models include Intangible Assets Monitor (Edvinsson and Malone, 1997), and Skandia Navigator (Sveiby, 1997) which were particularly developed with intellectual capital in mind and the Balanced Scorecard (Kaplan and Norton, 1996; Lipe and Salterio, 2000) which had a more general strategic focus. The Balanced Scorecard (BSC), for example, considers relational capital (customer perspective), structural and human capital

(innovation, learning, and internal perspectives) and the impact of IC on shareholder goals (financial perspective). Whilst the original advocacy was to help support and map strategy with a strong consultancy emphasis, it has latterly been suggested to address IC aspects (Kaplan and Norton, 2004). Lev (2001) advocates the Value Chain Scoreboard, to be used by both management and investors, which seeks to report in a structured manner the impact of intangibles on corporate performance and valuation.

As many of these performance measurement frameworks have been developed or adapted to accommodate IC, we expect to find these to be more in evidence in firms with high IC investment. This leads us to suggest that firms with relatively high IC are more likely to employ non-financial measures and performance measurement framework approaches involving balanced, multi-dimensional measurement, and economic profit-type approaches linked to shareholder value and requiring recognition of intangibles within the asset base.

Budgets and control

All listed companies face external pressures for earnings estimates and detailed forecasting, this is likely to have an impact on internal budgeting processes. Accounting-based budgetary controls are an integral part of the management control system in organisations (Webb, 2002; Van der Stede, 2001; Armstrong *et al.*, 1996). Exactly how this planning and control manifests itself may be different in organisations with different levels of IC. There is, for example, growing recognition of the limitations of conventional budgeting (e.g. Stewart, 1990; Bunce *et al.*, 1995; Fanning, 2000; Hope and Fraser, 2001; Jensen, 2001; Wallander, 1999; Hansen *et al.*, 2003; Marginson and Ogden, 2005). Contemporary suggestions for improvement include approaches such as zero-based budgeting, priority-based budgeting, activity-based budgeting and regular re-forecasting (Fanning, 2000). However, they can be bureaucratic, internally focused and time consuming. Budgeting has thus been described as being "out of sync" with the information age (Hope and Fraser, 1997) and that Knowledge firms should reduce or even eliminate the emphasis on conventional budgeting (Hope and Fraser, 1997, 1999; Stewart, 1990; Wallander, 1999). Some high IC firms (such as Svenska Handelsbanka, the largest commercial bank in Sweden) claim to have benefited from this reduced emphasis. The "Beyond Budgeting" model, based on enterprise, innovation, and empowerment, is offered as more relevant to the "information age" (Fanning, 2000). This model involves separating target setting from financial planning and more frequent high-level financial forecasting. In their case research into the management control of intangibles, Johanson *et al.* (2001) observed in one company:

> ... Budgets are no longer done and instead scenario orientated business plans are performed. The control process of intangibles consists of sub-processes including recurrent meetings, benchmarking, target setting, assigning ownership ... (p. 723).

Work originating with Hopwood (1973) identified three management styles for evaluating performance using budgets:

(1) A *budget constrained style*, where evaluation of performance is based on the ability of the manager to meet the budget on a short-term basis;

(2) A *profit conscious style*, where evaluation is based on the ability of the manager to increase the general effectiveness of the unit in terms of the long-term objectives of the organisation; and

(3) A *non-accounting style*, where evaluation of performance is based largely on non-accounting information and budgeting plays a relatively unimportant part in a superior's evaluation of performance.

Fanning (2000) suggests that the non-accounting style is more appropriate for high IC firms because budgeting tends to focus on short-term financial inputs and outputs.

We thus suggest that traditional hierarchical budgeting and budget-constrained style may apply to traditionally structured firms with low IC. High IC firms will place less reliance on budgeting in both its traditional and "zero-base" forms, preferring more frequent forecasting, and separate target setting (that is following the beyond budgeting concept). They are also more likely to, adopt a non-accounting evaluation style. We expect the above to be more apparent where Human and Relational capital are emphasised.

Capital budgeting

Whilst the capital budgeting literature over the past 20 years has developed increasingly sophisticated financial appraisal approaches, corporate reality suggests the importance of managers considering the strategic benefits of long-term assets. Thus NPV techniques are complemented by a broader strategic cost management approach such as value chain analyses, cost driver analysis, and competitive advantage analysis (Carr and Tomkins, 1996).

Carr and Tomkins' research (1996) found that companies pay less attention to traditional capital budgeting techniques, while others suggest that traditional appraisal techniques are no longer appropriate for intangible investments given the non-financial benefits and inter-related cost complexity that exists (Irani *et al.*, 1998). Mouck (2000) argues that "The traditional capital budgeting model is virtually useless for the high-tech, knowledge-based, increasing returns sectors of the economy". Increasingly, firms invest less in tangible assets, and more in R&D, training, marketing, software, and other intangibles. These are hard to justify using conventional capital budgeting tools (Irani *et al.*, 1998).

The growing literature on real options (Trigeorgis, 1996; Neil and Hickey, 2001; Seth and Sung, 2001) considers the value of option-like features within capital investment decisions. Real options valuation extends the traditional capital budgeting approach by providing a more appropriate evaluation of strategic investments. Of particular relevance to this study is the strategic or follow-on option. High IC firms that have invested heavily in innovation will be in a better position to exploit future opportunities, as yet unidentified. These strategic options would include such areas as entering new markets, development of follow-on products, and development of brand extension. A rigorous analysis on real options, even within large firms such as those surveyed, is still rare, and there is currently debate about the most appropriate way that this can find its way into practice (Copeland and Antikarov, 2005). However, this is not to say that managers involved in investment decision making, such as large-scale expenditures on R&D, new product development and advanced manufacturing technology, do not consider the value of real options. Derregia and Chittenden (2004), in

a study of UK firms, observe real option-like thinking processes among managers in considering investment projects, frequently using simpler versions of real options models to evaluate investment opportunities (for example, Stark, 1990).

Valuation of IC investment is generally complex, where much of the value is attributable to flexibility and learning over time. Strategic flexibility provides corporate management with real options to exploit future events as they present themselves. The resource-based view of the firm argues that sustained competitive advantage derives from the firm's resources and capabilities – bundles of tangible and intangible assets, including management skill, organisational processes and routines, and the information and knowledge it controls (Barney, 2001). High IC firms, with a strong focus on managerial creativity, innovation, intellectual property, customer relationships, and knowledge embedded in information technology, typically possess considerable strategic flexibility. Traditional DCF models do not capture the value of options embedded in corporate decisions. Follow-on investment opportunities are typically intangible and speculative. Companies with relatively high IC possess greater strategic flexibility, and are therefore expected to place less reliance on conventional capital budgeting approaches such as net present value. This is expected to be more pronounced where structural capital is the IC focus because follow-on options are more easily identifiable.

Economic exposure and business performance

Risk management is the process of analysing economic exposure to risk and determining how best to handle such exposure. Risks can be minimised or avoided through appropriate risk management practices. Given the above discussion on strategic flexibility, real options and adopting a resource-based view of the firm, we expect that firms with high levels of IC – particularly in the form of creativity, intellectual assets, and relational capital – are better positioned to be able to withstand, and even exploit, the effects of unanticipated changes in markets and economies. This presumes of course that companies always use their IC to advantage, which may not always be the case.

IC can have a significant impact on value creation and the value of the firm. The question is whether IC can also help management cope with uncertainties in product and financial markets. One argument is that IC offers valuable protection during economic downturns through patents, brands, customer relationships, flexibility and inventiveness, enabling the firm to be more competitive than low-IC firms. However, a contrary view (Lev and Zarowin, 1999) argues that given the growing asymmetry in relevant information disclosure and the apparently deteriorating association between earnings and stock prices, there is greater scope for surprise resulting in greater stock price volatility for high IC firms. In other words, while the resource-based view argues that the firm is better positioned than other firms during economic downturns, information asymmetry suggests that investors are not able to observe this through information disclosures, leading them to rely more heavily on the better understood value content of tangible assets. For this reason, we expect to find that high IC firms are not better equipped to withstand stock market downturns.

Finally, we consider how the level of IC may impact on corporate performance. This study does not employ secondary data sources for accounting and stock market performance. Rather, it asked senior executives to give their perception of the

performance – both financial and non-financial – relative to their sector. Such respondents are well positioned to address such issues as market leadership, competitiveness, new product development success, as well as financial performance in accounting and stock market terms[2].

We expect that, within an industry sector, high IC firms possess the resources to outperform firms with low levels of IC. While this may not necessarily be reflected in short-term financial performance, it should be evidenced in terms of industry leadership, competitiveness, and successful new product development. Superior performance on these dimensions should in the longer term be reflected in financial accounts and stock market performance measures.

Research method

In this research we seek to examine how MAPs found in firms vary with the level and shape of IC, in terms of human, structural, and relational capital. We then explore the impact of IC on perceived corporate performance. The conceptual framework is shown in Figure 1.

This framework identifies a number of MAPs expected to be influenced by IC intensity. We earlier identified the main MAP categories as reporting and decisions, performance measurement, budgetary control and capital investment analysis. IC intensity is also assumed to give rise to higher levels of performance and an ability to respond to economic uncertainty.

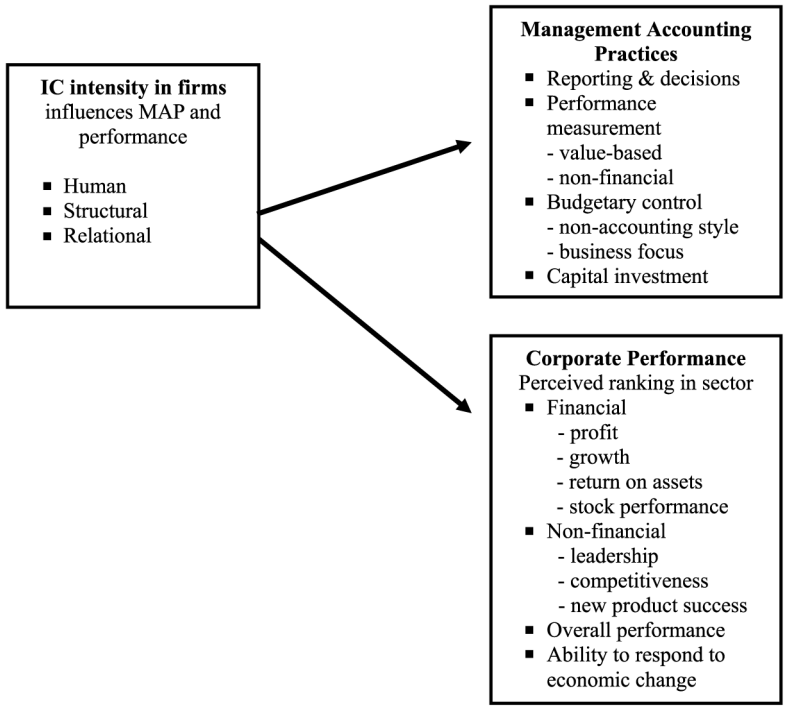

Figure 1.
Conceptual framework

The nature of the study is both exploratory and descriptive. Most prior research on IC has employed questionnaire surveys only in data collection (e.g. Bontis, 1998; Dooley, 2000; Lovero, 2000; Reeds, 2000; Usoff *et al.*, 2002), this study uses both a questionnaire and semi-structured interviews. The research was conducted in Malaysia, the fifth most competitive country in the world according to the 2004 *World Competitiveness Yearbook*. The country has, for some years, developed a Multimedia Super Corridor close to where the companies involved in this research are located. In spite of this being a developing economy, research into intellectual capital in developing nations has been undertaken successfully before (Abeysekera and Guthrie, 2004). The companies were randomly selected from Kuala Lumpur Stock Exchange (KLSE) lists, mostly drawn from four broad sectors, where IC is expected to be beneficial. Data were collected, during 2003, through a questionnaire survey and interviews were conducted with both accounting and non-accounting executives in selected companies.

Questionnaires were distributed to accountants/financial managers in 193 companies listed on the KLSE. The initial and second mail shots produced useable responses from 85 companies, an effective response rate of 44 per cent. Approximately half the responses came from four sectors identified by Edvinsson and Malone (1997) as having a strong emphasis on IC – technology, consumer products, trading and services, and finance. The sample was supplemented by a further 34 responses drawn from large, unlisted, firms, producing a final sample total of 119 firms[3].

The questionnaire asked respondents to indicate their agreement to 25 questions (on a 1-7 scale) on a range of questions relating to their company's emphasis on IC. This formed the basis on which level and shape of IC was established. These questions were drawn from earlier work that was used to explore the nature of intellectual capital, (Bontis, 1998; Reeds, 2000; Usoff *et al.*, 2002). These items have already been tested in terms of reliability in the earlier published research. Responses were used to construct variables for human (HIC), structural (SIC), and relational (RIC) capital.

The questionnaire then required responses to 76 other items covering management accounting practices, economic exposure and performance. Some of these were personally developed based on the literature, whilst others were adopted or adapted from prior work of Bontis (1998), Reeds (2000), Usoff *et al.* (2002), Hopwood (1973), Hope and Fraser (1997), Irani *et al.* (1998), Segelod (1998, 2000), and Fanning (2000). The questionnaire asked respondents to indicate the degree of importance, the nature and use (1-7 scale) of a range of management accounting practices in their organisation. This was undertaken in the areas of reporting and decisions, performance measurement, accounting style, budgetary control, and capital budgeting, as outlined in the literature above. Finally, the questionnaire raised questions on perceived performance (financial, non-financial, and overall performance) of the companies in terms of the respondent's sector.

Further insights were obtained from interviews with senior managers in four companies in the Kuala Lumpur area who participated in the survey. This involved companies engaged in software and telecommunications, manufacturing, broadcasting, and banking. They were conducted with accountants, human resource managers, marketing managers and intellectual capital/knowledge managers, as appropriate, in each of the companies. These interviews provided valuable insights that could not be achieved through postal survey, through further explanation and commentary, which broadly confirmed the survey findings.

Table I summarises the descriptive statistics for IC survey questions and constructs.

Analysis of descriptive statistics, tests for reliability, and response bias all indicate that the responses used in this study meet the levels of reliability and validity required for meaningful further analysis[4]. Inter-item correlation and Cronbach alpha scores were used to estimate the reliability of the scales[5] and confirm that the scales

Variables	*N*	Range	Mean	SD	Inter-item corr.	Alpha
IC importance			5.17	1.08		0.69
Degree of IC	109	2-7	5.14	1.34	0.36	
Importance of IC	109	3-7	5.84	0.98	0.53	
Knowledge or IC	107	1-7	5.32	1.50	0.19	
IC reporting			4.70	1.62		0.72
IC info published in annual report	90	1-7	3.47	1.74	0.41	
IC reported internally	98	1-7	4.67	1.68	0.67	
IC referred to in strategic decisions	96	1-7	5.27	1.43	0.56	
Human Intellectual Capital (HIC)			5.55	0.79		0.82
Managers selected according to their brightness and creativity	112	1-7	5.32	1.30	0.53	
Managers and staff are committed	113	2-7	5.50	1.11	0.72	
Staff are required to share knowledge	114	3-7	5.83	0.99	0.40	
Staff are experts in their jobs	114	3-7	5.74	0.88	0.59	
Managers and staff are innovative	115	3-7	5.39	1.08	0.64	
Staff are able to focus on quality	115	2-7	5.53	1.10	0.66	
Structural Intellectual Capital (SIC)			5.07	1.00		0.87
Relevant information are easy to access	114	1-7	5.16	1.35	0.54	
Systems/procedures support innovation	113	2-7	5.07	1.27	0.65	
Systems/procedures require knowledge sharing and encourages learning	113	2-7	5.71	1.12	0.45	
Investment in innovation is high	110	1-7	4.85	1.50	0.61	
Intellectual assets are tracked and used fully	95	1-7	4.81	1.85	0.61	
Innovation rate is high compared to competitors	98	1-7	4.83	1.46	0.60	
High annual allocation is provided for IT	109	2-7	5.00	1.32	0.70	
Knowledge is documented in manuals, database, etc.	113	1-7	4.98	1.44	0.60	
Vital knowledge is protected to prevent loss in case prominent staff leave	114	1-7	5.09	1.41	0.79	
Relational Intellectual Capital (RIC)			5.49	0.90		0.92
Customers are loyal	112	1-7	5.13	1.20	0.66	
Market-oriented/customer-focused	114	2-7	5.60	1.23	0.73	
Efficient in satisfying customers	113	2-7	5.28	1.21	0.84	
Understand target segments and customer profiles	113	2-7	5.51	1.09	0.79	
Gets strong feedback from customers	114	1-7	5.41	1.27	0.78	
Continually meet with customers	112	2-7	5.50	1.25	0.71	
Listen and respond to customer complaint	112	2-7	5.63	1.07	0.72	
Have good relationships with suppliers	109	1-7	5.64	0.99	0.51	
Give time to vetting/ approving suppliers	108	1-7	5.39	1.15	0.60	
Maintain long-standing relationship with suppliers	107	1-7	5.85	1.04	0.55	

Table I.
Constructs and descriptive statistics of IC survey items

employed were internally consistent. These reduced to the three main composite IC variables – Human, Structural and Relational Capital, with acceptable reliability coefficients (between 0.82 and 0.92).

Findings and discussion

From Table I we observe that, while there is considerable variety in responses, the mean response for most questions is around 5 ("moderately important"). The study did not seek to categorise responding firms into "high" and "low" IC. Rather, it found associations between forms of IC (human, relational, structural), MAP and corporate performance.

The table reveals that the term "knowledge", rather than IC, is used by most firms. As expected, there is only moderate agreement that IC information is reported in or with the annual report. However, there is stronger agreement that IC is reported internally and in analysing strategic decisions. Respondents recognised all three main forms of IC, but it was most evidenced in human capital (5.5) and least on structural capital (5.1). In that only structural capital is truly transformed into intellectual assets, this demonstrates the challenge for firms seeking to use other forms of IC to leverage long-term value.

Association with underlying factors of intellectual capital

Principal Component Analysis was conducted on management accounting and performance questions to reduce the number of variables tested in the questionnaire to their underlying dimensions and create a more manageable and parsimonious set. These related to each main area of interest, namely performance measurement, budget control style, capital budgeting approach, economic exposure management and business performance.

The factor loading for each item and its corresponding construct was determined. Varimax rotation was used to rotate the factors in order to simplify the columns of the factor matrix[6]. A total of 12 factors were obtained from 61 management accounting practices and business performance items. Spearman-Rho's Rank Correlation was employed to identify associations between variables.

Table II summarises the descriptive statistics of the MAP questions in the survey and shows the eight factors created by PCA, together with reliability coefficients. Questions pertaining to performance measurement reduced to factors for P&L, value, financial/non-financial and performance measurement frameworks. Table III gives descriptive statistics for two economic exposure constructs (Stock market impact and Ability to respond to economic uncertainty) and three performance constructs (financial, non-financial and overall performance).

Table IV summarises the associations between IC and a number of assertions about accounting practices, analysed by type of IC. As expected, firms with higher levels of IC are more likely to report IC internally, to refer to IC information in decision making, and to capture IC in performance measures. Only in the case of SIC, where investment is more easily defined and measurable, are high IC firms associated with capital budgeting procedures that attempt to capture intangible costs and benefits and to define and review intangible investment. This is in line with some of the contemporary literature, which emphasises the difficulty in accounting for HIC (see, for example, Johanson *et al.*, 2001; Mouritsen *et al.*, 2001b).

Variables	*N*	Range	Mean	SD	Inter-item corr.	Alpha
P&L measures			6.52	0.71		0.47
Sales	112	4-7	6.57	0.67	0.66	
Profitability	111	2-7	6.50	0.77	0.74	
Value-based measures			5.12	1.15		0.77
EVA	93	1-7	4.56	1.82	0.47	
Target profit	114	1-7	6.19	1.13	0.59	
Shareholder value	108	1-7	5.77	1.49	0.65	
Properly account for all ways in which corporate value could be added or lost	111	1-7	4.95	1.26	0.51	
Incentive structure based on value creation	105	1-7	5.10	1.38	0.61	
Financial and non-financial			5.14	1.23		0.63
Measures IC measured in both financial and non-financial terms	110	1-7	5.73	1.18	0.36	
IC contribution captured in performance measurement	100	1-7	4.51	1.60	0.35	
Focus on future success	109	1-7	4.94	1.37	0.24	
Focus on past performance	111	1-7	5.17	1.29	0.18	
Financial focus	113	1-7	5.27	1.45	0.04	
Performance measurement frameworks			44.1	1.82		0.89
BSC	67	1-7	4.61	1.92	0.57	
Intangible asset monitor	47	1-7	3.28	1.84	0.75	
Tableau de Bord	27	1-7	2.37	1.57	0.93	
Skandia navigator	27	1-7	2.48	1.76	0.90	
Performance prism	39	1-7	3.64	2.08	0.62	
Budget control style			6.09	1.05		0.84
Budget emphasis	107	1-7	6.08	1.18	0.43	
Concern with ability to meet budget	112	3-7	6.15	0.90	0.46	
Concern with cost	113	2-7	6.21	0.87	0.52	
Concern with ability to increase general effectiveness	113	1-7	5.93	1.10	0.75	
Concern with quality	113	1-7	5.97	1.14	0.65	
Concern with ability to handle subordinates	113	1-7	5.27	1.34	0.67	
Concern with effort put on the job	114	1-7	5.68	1.16	0.69	
Beyond budgeting			4.64	1.57		0.48
Regular re-forecasting	88	1-7	5.18	1.68	0.57	
Separates target setting from financial planning	101	1-7	4.55	1.75	0.56	
Uses rolling forecasts	95	1-7	4.32	1.98	0.72	
Capital budgeting method			5.05	1.64		0.78
ROCE/ARR	103	1-7	5.75	1.41	0.47	
NPV	96	1-7	4.89	1.76	0.64	
IRR	101	1-7	5.04	1.74	0.72	
Payback period	99	1-7	5.53	1.40	0.56	
Real option value	51	1-7	3.12	1.70	0.53	
Assessing intangible investments			4.66	1.67		0.82
Finance methods unable to capture IC costs /benefits	101	1-7	4.55	1.74	0.35	
No system for defining/reviewing intangible projects	97	1-7	4.69	1.81	0.34	
Acceptance of negative NPV in investment appraisals	84	1-7	2.67	1.71	0.12	

Table II.
Constructs and descriptive statistics of management accounting practices

	N	Range	Mean	SD	Inter-item corr.	Alpha
Stock market influence			4.93	1.03		0.57
Firm is less affected by fall in stock market	109	1-7	4.81	1.75	0.41	
Firms will not overreact to fall in stock market	102	1-7	4.98	1.48	0.41	
Ability to respond to economic uncertainties			4.70	1.31		0.50
Staff creativity/innovation ensures long-term survival	112	1-7	5.28	1.20	0.34	
IC acts as hedge against unanticipated economic change	96	1-7	4.67	1.50	0.33	
Financial performance indicators			5.35	1.06		0.91
After-tax return on assets	114	2-7	5.00	1.07	0.79	
After-tax return on sales	108	2-7	5.00	1.11	0.72	
Profit growth	114	2-7	5.25	1.17	0.82	
Sales growth	112	2-7	5.41	1.04	0.72	
Profit	115	2-7	5.40	1.11	0.73	
Non-financial performance indicators			5.11	0.92		0.83
Industry leadership	114	1-7	5.31	1.41	0.73	
Success rate in new product launches	102	1-7	5.21	1.27	0.56	
Future outlook	115	2-7	5.47	1.08	0.79	
Overall response to competition	111	1-7	5.40	1.13	0.70	
Overall business performance	115	2-7	5.62	1.00	0.76	

Table III.
Constructs and descriptive statistics of performance and volatility measures

Importance of:	HIC	SIC	RIC
Reference to IC in management accounting practices			
Majority of investments are intangible	0.312**	0.466**	0.212*
Internal IC reporting	0.347**	0.475**	0.366**
Reference to IC information in strategic decisions	0.370**	0.489**	0.357**
Performance measures capture IC contribution	0.512**	0.608**	0.502**
Inability of financial methods to capture intangible costs and benefits	−0.090	−0.209*	−0.099
No system for defining, requesting and reviewing intangible investments	−0.194	−0.276**	−0.149

Notes: Significance levels: * = 0.05, ** = 0.01

Table IV.
Associations between IC level and use of IC in management accounting practices ($n = 119$ firms)

Management within the case companies tended to use the term "Knowledge" rather than IC, with the exception of the software company, which applied the term "Intellectual Property". This company had the most advanced intellectual capital management process, coordinated by a Director of Intellectual Capital. None of the case companies published additional IC information in or with the annual report, though all of them reported it internally and referred to it in strategic decisions. The Broadcasting company was an interesting example of this, observing that the reports on the production houses were "indirectly reports on IC".

Performance measurement

Table V summarises the association of MAPs such as performance measurement, control style and capital budgeting process with the three main forms of IC, and shows

Importance of	HIC	SIC	RIC	Variables loaded on factors
Performance measurement				
Importance of:				
Value-based financial performance measures	0.294**	0.408**	0.410**	Shareholder value, EVA, Incentive structure base on value creation, accounts for corporate value
Profit and loss accounts-based financial performance measures	0.175*	0.151	0.115	Sales, profitability
Performance measurement frameworks	−0.032	.089	−0.105	Intangible assets monitor, Tableau de Bord, Skandia navigator, BSC, Performance prism
Financial and non-financial measures	0.542**	0.599**	0.579**	Performance measures include both financial and non-financial aspects
Control style				
Business emphasis	0.523**	0.455**	0.488**	Concern with: cost, general effectiveness, quality, ability to handle subordinates, job effort
Budget emphasis	0.033	0.044	−0.035	Budget emphasis, ability to meet budget
Forecasting	0.239**	0.180	0.231*	Separates target setting from financial planning, rolling forecasts, regular re-forecasting
Non-conventional budget	0.109	0.233*	0.132	Zero-based budgeting Priority-based budgeting
Capital budgeting process				
Financial measures	0.314**	0.321**	0.257**	Use of NPV, IRR
Acceptance of negative NPVs and use of real options	0.085	0.160*	−0.107	Acceptance of negative NPV in capital investment appraisals, use of real options approach

Notes: Significance levels: *=0.05, **=0.01

Table V.
Associations between IC variables and management accounting practices

the main questions that loaded on to each factor. Regarding performance measurement we see that value based approaches such as Shareholder Value Analysis, EVA® and incentive structures linked to value are strongly associated with high levels of human, structural and relational capital. It should be noted that both of these value-based approaches require estimation of the value of IC.

While there is little evidence that high IC firms have discarded traditional financial measures such as sales and profit, they attach significantly greater importance to employing a combination of financial and non-financial performance measures. This recognises that IC impact cannot be assessed purely in financial terms, suggesting that performance measurement frameworks should be highly suitable to such firms.

However, looking at the specific performance measurement frameworks used by the sample firms, we observe that there is no association between their adoption and the degree of IC in firms. Adoption of comprehensive performance measurement models is generally low. Some of the techniques and frameworks, which have specific relevance

to IC, such as the Intangible Asset Monitor or Skandia Navigator, are hardly recognised in Malaysian organisations. But as these frameworks, other research such as the more recent Danish experiments (Meritum, 2002) and the challenge posed by management of intangibles receive greater exposure through international discussion, it may be that they will be more adopted. Although there was general awareness of the Balanced Scorecard approach, it was not widely used, nor was it viewed as an important tool in ICM. Adoption of specific frameworks such as the Balanced Scorecard has been suggested, by some, to be a case of following a particular fashion or industry leader, a sort of "me too" phenomenon. There is some evidence here to support the notion of the adoption and spread of new techniques being influenced by Institutional factors, a sort of institutional isomorphism (DiMaggio and Powell, 1983) rather than a need identified specifically through an association with the level of IC in the firm; or it may be that they are simply perceived not to work for these companies. For example, Mouritsen *et al.* (2005) have pointed to differences between the theoretical underpinnings of the balanced scorecard and intellectual capital.

Interviews with accountants in the case companies found that superiors gave importance to both financial and non-financial matters in evaluating their performances. All companies interviewed confirmed that they used a combination of both financial and non-financial measures. All except the broadcasting company viewed this as a first step towards a performance measurement framework such as the Balanced Scorecard but few had taken it further. Sales and profitability remain the most frequently employed measures, although the software and the manufacturing companies both employed EVA® as one of their financial measures. The IC director of the software company commented:

> The performance measures must be understood by the persons in charge. In the past the system has been more in the form of financial measures. A non-financial performance measurement system is definitely planned for increased use in the future.

However, the financial manager was still not convinced:

> No matter what approach is being used for performance measurement, the bottom line is still financial figures, i.e. financial reports that top management and investors want to look at.

Tension between the two views on the appropriate form of performance measure was observed, with the IC director concluding:

> We have a lot of innovations going on, definitely, innovation here is not just in technological form, but also business innovations. The innovation is how we approach the market, how we design solution for customers, and so on. The challenge is how effective it is to convert innovations into revenues. We shouldn't just document the innovations, but also commercialise them.

In the manufacturing company the financial accountant pointed out:

> . . . the company has both financial and non-financial measures for performance. For example, it measures the motivational climate of the company, i.e. whether people of the company are happy or not, by using a "global people survey". The other measures are statistical, for measuring efficiency and effectiveness, such as stock holding, capacity utilisation, and customer service. However these non-financial measures are not conveyed in the annual report.

In the Bank the VP finance observed that all banks had to comply with the controls applied by the Central Bank, these are currently mainly financial. The bank had however developed a number of non-financial measures, he confirmed:

> Some examples of the bank's non-financial measures are efficiency measures, such as turnaround time, loan processing time, counter service (customer queuing time), and customer complaints' processing time. BSC was introduced by the bank's consultant in 2002, and has been implemented since January 2003, starting with the marketing department. It is still too early to assess the progress of the BSC implementation.

From our examination of the performance measurement systems in knowledge-driven firms we conclude that there is greater emphasis on value-based measurement approaches and growing emphasis on a combination of financial and non-financial measures that have yet to be established in scorecard type models that adequately measure the IC contribution. This seems to be a partial confirmation that IC resources are seen as performance drivers of value creation and part of the causal link between skills and relationships, which deliver customer satisfaction, loyalty and ultimately customer value. This suggests scope for more work to be undertaken taken to establish credible cause-effect relationships as part of a process of performance measurement improvement process (Neely *et al.*, 2002).

Budgets and control

Table V also draws attention to how budget style and approach vary according to the IC emphasis. In terms of an accounting evaluation style we are able to distinguish between firms with styles that either emphasise the budget or have a broader orientation which we term business emphasis, the latter focusing on concerns for general effectiveness, quality, cost, handling staff, and job effort. High IC firms are strongly associated with a business focus but not with a budget emphasis. This supports earlier arguments that the typical short-term budgeting focus is not consistent with high IC firms (Johanson *et al.*, 2001).

From the responses we find that firms with high IC levels typically place less emphasis on ability to meet budget targets nor do they take an exclusive budget emphasis. Concern for quality and improved general effectiveness are associated with all three forms of IC. Firms with high levels of Human Capital and Relational Capital are associated with use of regular re-forecasting, target setting, and rolling forecasts – a style we categorise as "Forecasting". The non-conventional budget styles such as Activity-Based Budgeting, and Priority-Based Budgeting is associated with high levels of structural capital such as research and development but does not feature significantly in the context of human or relational capital.

Paradoxically, interviews in the case companies revealed that managers espoused that a relatively strong budget emphasis existed in their companies, that is, emphasis on the budget and an ability to meet the budget. However, they also recognised the importance of ability to increase the general effectiveness of the unit in addition to a concern for cost. There was little evidence of a more relaxed or "flexible" budgeting style. The bank had a procedure in budgeting close to the priority-based approach. The other case companies indicated they were applying an activity-based budgeting style.

In the Bank the VP Finance declared:

> ... the Budget is emphasised in the bank, and we are slowly evolving from the traditional budget style as a more modern approach is implemented. Additionally related to capital

> budgeting, since investments are in the form of both tangible and intangible assets, financial and non-financial methods are used in capital investment appraisals. Negative NPVs would be accepted if the project proposal were really convincing, such as giving good market and business analyses.

This may signal the opportunity for internal reporting to move from a narrow accounting focus towards the greater use of narratives both internally as well as in external reporting, as has been suggested from some sources (Mouritsen *et al.*, 2001a; Roslender and Fincham, 2004. From the evidence here however, it maybe only beginning to emerge in the setting we have explored.

Capital budgeting

In terms of whether the level of IC within firms influences capital budgeting approaches we find that firms with higher levels of IC attach greater importance to conventional financial capital budgeting approaches such as accounting rate of return, payback, net present value, and internal rate of return. This was also found in our four case companies. We have already observed that for high SIC firms there is weak support for the fact that they are more likely to have capital investment systems that capture the costs and benefits of intangibles. They are also more likely to use a real options approach, and accept projects where the financial appraisal does not support such action. Real options are particularly relevant to R&D projects and strategic decisions where many of the benefits are long-term and hard to quantify.

In the software company the financial manager, very honestly, confirmed that the accounting and finance function needed to become better acquainted with some of the concepts of IC:

> The system is not there yet.

She conceded that even though formal non-financial or strategic appraisal of projects is not really applied in the company, it does occasionally proceed with projects, which show low or negative NPVs, for business reasons.

The accountant in the Broadcasting company repeated a similar message:

> Investments of the company are both tangible and intangible, but there is no real system for capturing the costs and benefits of the intangible investments.

Similarly, management at the bank declared:

> The capital investment process is heavily financial and thus it does not easily capture the intangible costs and benefits in any direct way.

There has long been the assertion that decisions are effectively taken well before the formal approval stage, financial analysis being little more than a way of legitimizing decisions which management had already taken (Bower, 1970; Aharoni, 1966). This may particularly be the case with knowledge-driven firms where many of the costs and benefits cannot be captured by conventional capital budgeting, investment being a matter of faith.

Economic exposure and business performance

Where firms have invested heavily in IC, such as in creative people, powerful brands, strong customer relations, patents, or knowledge bases, they should be in a good

position to manage unanticipated economic events. We asked respondents to assess the extent to which their organization was affected by economic or stock market downturns. Table VI offers strong evidence that firms with high IC levels felt that they were better able to cope with such events. Knowledge-driven firms are perceived to have competences in their creative people, structures and external relationships that act as a hedge against unanticipated economic change, forming an important element of the corporate risk management strategy. If this were the case, we would expect to find that high IC firms enjoy a lower cost of capital.

Our findings suggest that firms that manage their IC are better able to respond to unanticipated economic and market change. Managers interviewed support this argument:

> The business is risky as it depends highly on airtime sale. When there is an economic downturn, airtime sale also falls. The company is a little fortunate as IC hedges against economic uncertainties and ensures its long-term survival. This is because besides airtime it also has movies and documentaries that can be sold in the form of CDs and TV programmes to some foreign countries (broadcasting company).

> The bank's IC (such as its public reputation) will be a hedge against economic change and market uncertainties as well as to ensure its long-term survival (bank).

In the manufacturing-company the supply-chain director declared:

> Our strong brands and trademarks also act as a hedge against market economic uncertainties.

Importance of:	HIC	SIC	RIC	Variables loading
Economic exposure				
Ability to respond to economic uncertainties	0.421**	0.540**	0.496**	Managers' and staff's creativity and innovation ensure firm's long-term survival, IC acts as hedge against unanticipated economic change
Stock market influence	−0.019	0.017	0.096	Will not be hit badly by fall in the stock market, will not over-react to fall in stock market
Corporate performance				
Financial performance indicators	0.056	0.121	0.171*	After-tax return on assets, after-tax return on sales, profit growth, sales growth, profit, share prices
Non-financial performance indicators	0.417**	0.444**	0.480**	Industry leadership, future outlook, overall response to competition, success rate in new product launches
Overall business performance and success	0.346**	0.429**	0.467**	

Notes: Significance levels: *=0.05, **=0.01

Table VI.
Association between IC and business performance and contextual variables

The marketing management agreed:

> ... We have sound and clearly understood strategies, brands that serve people's basic needs and aspirations and generate dependable cash flow. These are the essential elements, together with a proud corporate reputation, which will enable us maintain momentum of our Path to Growth.

However, while respondents recognised that IC helped combat uncertainty, they did not agree that high IC firms were less susceptible to stock market falls or to investor overreaction. Lev and Zarowin (1999) argument may hold among Malaysian firms; the greater information asymmetry between investors and the board in high IC firms means that there is greater scope for surprise resulting in greater stock market volatility and stock price overreaction.

We next consider whether there is evidence suggesting that firms with higher IC are perceived to achieve higher performance levels relevant to their sector than other firms. Regarding short-term financial performance the evidence for superior performance is weak, only RIC showed significantly higher agreement level for high IC firms.

However, we find positive association for the IC variables with industry leadership, future outlook, response to competition, successful new products, and overall business performance. It is clear that respondents in high IC firms gave a significantly higher performance rating than respondents in low IC firms. This further support for previous work by Nonaka and Takeuchi (1995), Bontis (1998), Teese (2000) and Bröcheler *et al.* (2004).

There is a strongly held perception by respondents that the level of IC is associated with higher levels of overall business performance. This finding is supported by the IC director of the software company, when he commented above on not just documenting innovations, but on converting them to revenues, that is, commercialise them. The findings bring out this challenge to accounting: management believe that IC enhances business competitive and non-financial performance, but it has yet to show up clearly in corporate financial performance or in the reaction of the stock market.

Conclusion

Intellectual capital resources are often context specific, idiosyncratic and interconnected (Marr *et al.*, 2004) so no perfect solution is possible. However, managers of high IC companies need to be able to develop knowledge-based strategies, communicate and demonstrate the "value relevance" of these strategies. Then through a combination of financial and non-financial methods they should develop a performance measurement framework and control system, which ensures these strategies are realised. This paper has reported the perceptions of Malaysian accountants and managers in their dealing with the measurement and management of intellectual capital.

In the context of contemporary interest in accounting for intellectual capital and greater academic emphasis on external reporting, this paper deals with research into management accounting and IC. This work builds on our insights, often from case studies, in relation to performance measurement, control and strategic decision-making where characteristics of high IC are displayed. Relatively few surveys have been reported on management accounting for intellectual capital. In this paper, we have examined the question of whether the level and shape of intellectual capital within

firms influences management accounting. We have offered findings based on a survey of large Malaysian firms, which showed that some respondents had high levels of IC (appropriately analysed into human, structural and relational capital) but with some significant variation amongst respondents. Our research suggests that the level of investment in IC is associated with management accounting practices, business performance, and the ability to respond to future events.

It has been shown that IC does influence some aspects of management accounting, this particularly tends to involve the use of value-based and a mix of financial and non-financial measures, rather than those with an exclusive profit focus. Established performance measurement frameworks did not feature strongly in these companies. Their control style contained a "business" rather than a budget emphasis, with some of the re-forecasting and decentralised approach associated with the beyond-budgeting model, especially in companies with high human capital.

There was evidence of the use of financial measures for capital budgeting and this may benefit from further enquiry into the extent to which this is for making or legitimising decisions. There is limited evidence from practitioners of the use of a "real options" approach to capital budgeting in spite of this being recommended in the literature, such a situation is not peculiar to Malaysia or any developing country however.

Respondents believe that high IC helped them cope with economic uncertainty but they did not agree that they were less susceptible to stock market movement or investor reaction.

One interesting issue that future research could address is how IC changes give rise to MAP changes. For example, a longitudinal case study might usefully explore how in a particular firm, experiencing increasing IC intensity, the accounting style or performance measurement process evolved. For example, what are the instigators and circumstances in IC terms, that affect a transition from a budget-constrained to a business-focus or non-accounting accounting style?

Further work could be conducted to assess whether some firms have a better fit between MAP and IC than others, and does this reflect in superior performance? The research could also establish whether the associations between IC and performance are supported by stock market performance based on secondary data sources. Rather than using self reported performance as in our research.

Notes

1. The most popular form is Economic Value Added ® developed by Stern Stewart and Co. The Accounting Standards Boards (2005) Reporting Standard on Operating and Financial Review offers a number of economic performance measures for reporting to members such as return on capital employed, incremental returns on investment, economic profit type measures and organic rates of growth and returns.
2. Partial validation of financial assessments was provided by testing selected responses against secondary accounting performance data.
3. Comparison of means for key questions revealed that the additional 34 responses were not significantly different to the main sample.
4. *T*-test (comparison of mean scores between groups) was made on the responses from the first and second mailing to find out whether there was an element of bias in respect of the time they were received. Based on the test, we conclude that there is no response bias for the data

collected, as there is no statistically significant difference in the mean of the variables for the two groups Inter-item correlation was employed to ensure validity and reliability of the data. The estimation was based on the average correlation among items within a construct, which is concerned with "internal consistency" (Nunnally, 1978). This reliability analysis was conducted for all the measuring instruments in the questionnaire. In total, 11 of the questionnaire items scored less than 0.3, the acceptable level for inter-item correlation. Two of the items (the term "knowledge" is used rather than "intellectual capital") and ("Acceptance of negative NPV in capital investment appraisals"), were retained because they represented additional domains of interest (Churchill, 1979). These items were then separated from the original dimensions in which they were originally designed to be, the other items were removed.

5. All the items that scored lower than 0.3 for inter-item correlation were discarded, Cronbach's alphas were then recomputed. The reliability improved, and the range was between 0.4645 and 0.9173. Even though two variables, i.e. "Profit and loss-based financial measurement" and "Ability to withstand economic uncertainties" scored lower than 0.5 (Nunnally, 1978), their inter-item correlations were higher than 0.3. Therefore, the two variables were retained.
6. Alpha values over 0.6 were deemed to be acceptable for this exploratory study (Hair *et al.*, 1998). Inter-item correlation was also used for reliability testing. A correlation between 0.2 and 0.4 was deemed reliable (Pallant, 2001). Inter-item correlation was considered whenever the alpha of a factor was lower than 0.6. Where a proposed scale item cross-loaded on more than one factor, the factor of the highest factor loading was chosen. If an item loaded on the wrong factor, it was dropped. Only items that loaded on their corresponding factors of 0.512 or greater were retained.

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