Journal of Construction in Developing Countries, Supp. 1, 23–41, 2012

A Balanced Scorecard Approach to Measuring Industry Performance

*Toong Khuan Chan[1] and Poh Tin Hiap[2]

Abstract: Stakeholders of the Malaysian construction industry produced a Construction Industry Master Plan to chart the strategic direction for the industry for a ten-year period between 2006 and 2015. The objectives of this paper were to review the recommendations of the master plan using the Balanced Scorecard approach, to develop a performance management framework for the construction industry and to propose a set of performance measures to allow stakeholders to monitor the progress of the implementation of the master plan in achieving its strategic aims. The Balanced Scorecard approach was used to evaluate the critical success factors, strategic thrusts and recommendations to ensure that the master plan presents a balanced view to enhance the industry's competitive standing. The review revealed that the recommendations generally address all four Balanced Scorecard perspectives but lacked focus on customer relationships in the *customer perspective* and customer management in the Internal Processes Perspective. Additional recommendations are suggested to address these gaps. A list of key performance measures for the Malaysian construction industry has been selected by linking each strategic thrust with the relevant performance measures.

Keywords: Balanced Scorecard, Performance measurement, Benchmarking, Construction industry

INTRODUCTION

A decline in the performance of the Malaysian construction industry in 2004–2006 has presented an opportunity for the industry to examine its strengths and weaknesses and to chart future directions towards strengthening its foundations to face future challenges. Towards the end of 2007, the Malaysian Construction Industry Development Board (CIDB) published a ten-year Construction Industry Master Plan (CIMP) (CIDB, 2007) for the construction industry to be implemented from 2006 to 2015 with the objective of refocusing the strategic position and charting the future direction of the industry. Through its strategic thrusts, recommendations and action plans, it was intended to provide industry stakeholders with a clear direction to convert the industry into one that is more sustainable, delivers high-quality products and related services, is performance-oriented and has an improved image. The main driver for the strategic plan was an average annual growth for the industry of only 0.7% during the period between 2000 and 2007, compared with an average annual gross domestic product growth of 5.5% over the same period. There were concerns that the construction industry, which is a major pillar of industrialisation and a major contributor to economic growth, was not performing at its best and was thus unable to meet the dual challenges of open markets and greater global competition. Procurement methods and practices, construction methods, planning and building plan

[1] Faculty of Architecture Building and Planning, The University of Melbourne, Melbourne, AUSTRALIA
[2] Malaysia University of Science and Technology, Selangor, MALAYSIA
* Corresponding author: tchan@unimelb.edu.au

approval procedures were some of the key areas that were identified as deficient. The availability of cheap foreign labour had previously encouraged the industry to adopt labour-intensive construction methods as opposed to more productive capital-intensive technologies. This has led to low productivity levels, unsafe and unhealthy practices, low quality and a general lack of interest among the local workforce in joining the construction industry (CIDB, 2007).

It can be argued that the CIMP, which consists mainly of a strategic plan and the efforts carried out by the CIBD in leading the implementation of the recommendations constitute only the initial parts of a business process improvement program. Common business process improvement program methodologies [e.g., the Shewhart Cycle (Shewhart, 1986) and the Deming Cycle (Deming, 1986)], include a "check" or "measure" dimension to ensure that the outcomes of the new processes are measured and compared against the expected results to ascertain any differences. The aim of this paper is primarily to address the lack of a system to "measure" the outcomes of the initiatives suggested by the CIMP. This process of determining performance measures is achieved by first reviewing the CIMP to ensure that the proposed initiatives address all aspects of industry performance. The second objective is to translate the CIMP thrusts and recommendations into a performance management framework that can act as the basis for industry stakeholders to recognise the linkages between these initiatives and the outcomes. The third objective is to derive a set of performance measures to gauge the performance of the construction industry over a range of activities so that stakeholders can monitor the construction sector's progress towards achieving its stated goals.

This paper is therefore divided into two main sections: the development of a performance measurement framework and the selection of appropriate performance measures.

DEVELOPMENT OF A PERFORMANCE MEASUREMENT FRAMEWORK

Over the last few decades, many performance measurement frameworks have been suggested and adopted for the purpose of improving performance. Good overviews of performance measurement frameworks in construction along with discussions and critiques of their deficiencies can be found in Kagioglou, Cooper and Aouad (2001), Bassioni, Price and Hassan (2004) and Costa et al. (2006). These frameworks include performance measures that can be implemented at the project, company or industry level, where the measures for the project perspectives are subsets of the measures for the company's performance and the aggregation of company measures evolve into measures for the industry. Kagioglou, Cooper and Aouad (2001) extended the framework for an organisation to the construction industry by adding "project" and "supplier" perspectives. Bassioni, Price and Hassan (2004) reviewed the three main performance measurement frameworks in the UK construction industry – the key performance indicators (KPI), Balanced Scorecard and the EFQM Excellence Model – and highlighted a range of issues that require further research. These include how existing performance measurement systems interact with newly developed systems, the setting of targets and standards for performance measures, the aggregation of measures, hurdles to implementation and the use of

performance measures to take managerial action. Some of these concerns were addressed in an article by Costa et al. (2006), which highlighted the role of performance measurement in enabling a company to benchmark its performance against that of other similar organisations in key business activities.

The choice of a theoretical model in this study was driven primarily by the availability of published sources of information and a good record of application across a broad range of industries rather than a rigorous review of the applicability of the various models. Kaplan and Norton's (1992) Balanced Scorecard (BSC) concept was selected to examine the coverage of the proposed strategic thrusts of the master plan across the traditional areas of financial performance, customer satisfaction, internal processes and innovation and improvement activities. The review, which is conducted across four broad perspectives, is expected to provide information on the uniform coverage of these perspectives and identify potential gaps. The BSC approach, which is built on the cause-and-effect relationship between the four perspectives, is then utilised to link the strategic thrusts to the operational performance described in the master plan.

The Balanced Scorecard Approach

The BSC approach, first introduced by Kaplan and Norton (1992), has been widely adopted by many companies and is viewed by researchers as a strategic management tool in developing a performance management system. It has been recognised that traditional financial measures do not predict an organisation's future performance as financial measures are lagging indicators that are targeted at past performance. By including non-financial measures, the BSC attempts to provide managers with more relevant information than that provided by financial measures about activities they are currently managing.

The BSC suggests that an organisation's ability to create value in the future will be driven by four major perspectives: financial, customer, internal process and learning and growth. In brief, the BSC describe the knowledge, skills and systems that employees will need (their learning and growth) to innovate and build the right strategic capabilities and efficiencies (the internal processes) to deliver specific value to the market (the customers), which will eventually lead to higher shareholder value (financial).

Following on the initial approach, which attempted to identify specific measures from a broader perspective, Kaplan and Norton (2004) further suggested creating a Strategy Map, which emphasised the linkages among these four perspectives. The BSC approach has evolved from a measurement system to a communication system that provides a one-page graphical representation of what an organisation must do well in each of the four perspectives to successfully execute a strategy (Niven 2006). A strategy map embeds the different items on an organisation's BSC into a cause-and-effect chain, connecting the desired outcomes with the drivers of those results. The next section describes how the map is built from the top down, starting with the strategic vision and then charting the routes that will lead to achieving the vision.

Review of the CIMP Initiatives and the Development of the Strategy Map

Although the BSC was primarily developed to motivate and measure business performance, the methodology has been implemented in numerous other areas such as information service (Peinaar and Penzhorn, 2000), hospitals (Tjahjadi, 2007), materials processing (Michalska, 2005) and research organisations (Mettanen, 2005). Applications of the BSC in the construction industry include the use of the framework for evaluation quality assurance (Landin and Nilsson, 2001), safety (Mohamed 2003) and information management (Stewart and Mohamed, 2003). Kagioglou et al. (2001) applied the BSC to construction firms and added "project" and "supplier" perspectives for the industry, arguing that the original four perspectives did not adequately cover the activities of these construction firms.
The BSC approach for an organisation typically starts with a financial strategy for increasing shareholder value. To extend this approach from a single organisation to the construction industry, the focus was shifted from increasing shareholder value to fulfilling stakeholders' requirements. Stakeholders require the industry to provide greater value for customers, enhanced benefits to the national economy and increased profits for construction companies. On a strategic level, the BSC translates the industry's mission and strategy into a comprehensive set of performance measures that provides the framework for strategic and management systems.

The construction industry master plan advocated eight critical success factors to establish an innovative, sustainable, professional, profitable and world-class construction industry in Malaysia. The master plan outlined seven strategic thrusts, which contained a total of 21 specific recommendations to fulfil the described vision and mission. In addition, eight critical success factors, elements that are imperative to successfully achieving the strategic thrusts and strategies, were identified in the master plan as essential because the vision's success depends on these factors (refer to Figure 2). A synopsis of the master plan and a summary of the recommendations are available from the CIDB-CIMP portal http://www.cidb.gov.my/cimp/index.php.

In this section, the strategic thrusts, critical success factors and recommendations of the master plan were reviewed against the four perspectives of the BSC by answering the four associated questions to determine if the master plan addressed all of the critical performance areas in a "balanced" approach. The eight critical success factors and the seven strategic thrusts were mapped to the four BSC perspectives, as shown in Figure 3, while the more detailed recommendations were visually transposed in Figure 4.

In the *financial* perspective, Kaplan and Norton (1992) suggested that companies have two basic levers for their financial strategy: *revenue growth* and *productivity*. The former includes increasing revenue from new markets, new products and new customers and increasing value to existing customers through cross-selling or bundling of products. The revenue growth strategy for the industry calls for the government to continue to invest in national development projects to support socioeconomic growth (CSF7), greater spending on maintenance and exporting construction products and services by offering total solutions (construction technology and financing) to overseas clients (ST7). Enhanced productivity is typically achieved by either simply reducing costs or developing new construction methods or production techniques. This theme is described in

the first strategic thrust, integrating the construction industry value chain to enhance productivity and efficiency (ST1) and the development of new construction methods (ST5) and improving human resource capabilities and capacities (ST4). There is no mention of a clear productivity strategy for improving the industry's cost structure or using assets more effectively in the master plan.

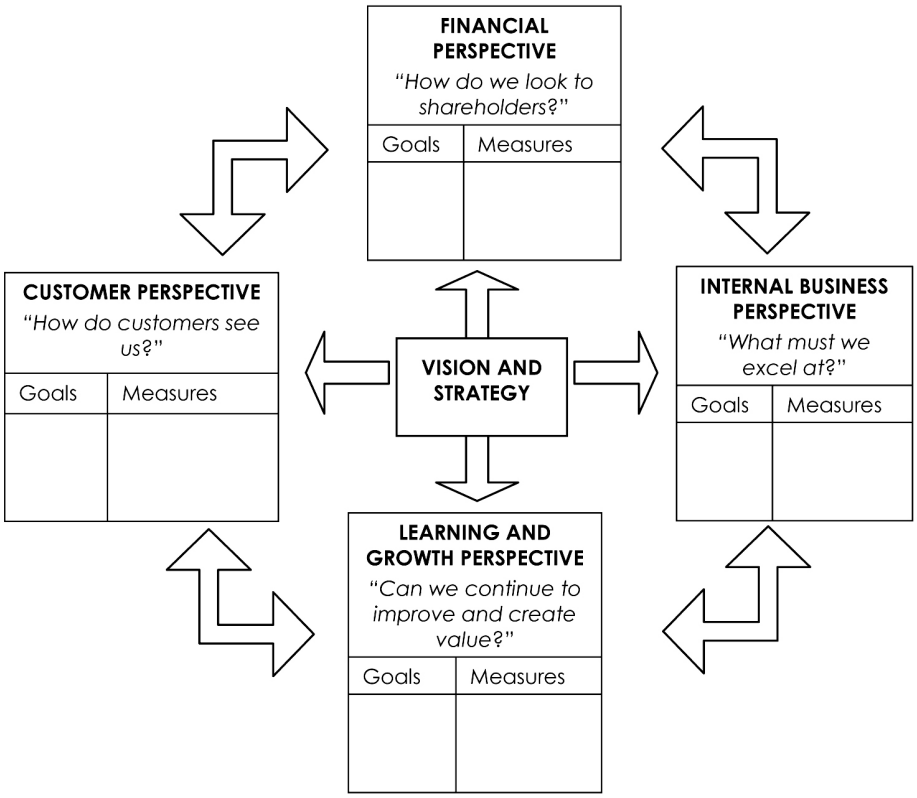


Figure 1. The Four "Balanced" Perspectives of the BSC (Adapted from Kaplan and Norton, 1992)

Although strategic thrust one included an initiative to enhance procurement strategies to increase value to construction clients (e.g., adopting a the partnership approach and seeking "win-win" collaborations), the action plan seems to focus mainly on internal processes such as recommending the use of standard contract form and resolving non-payment issues with the introduction of a Payment and Adjudication Act.

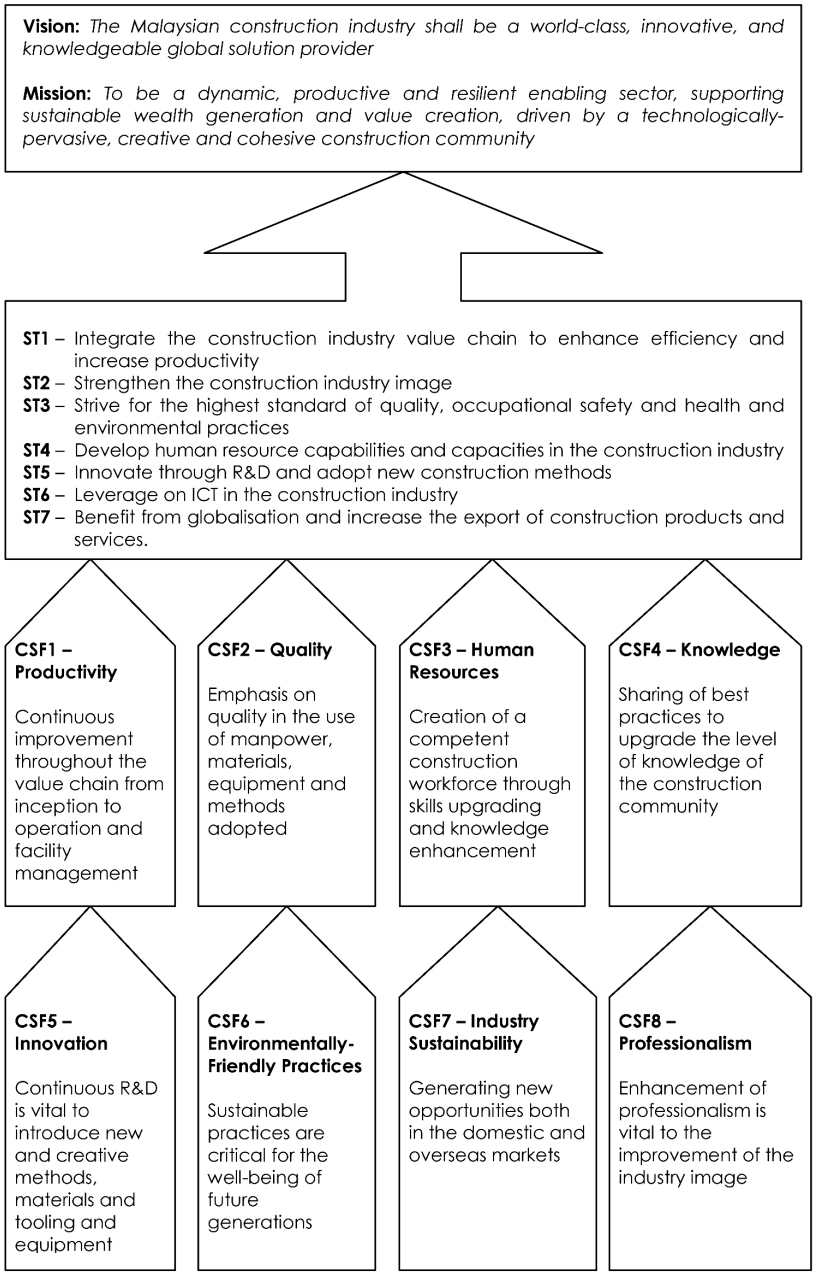


Figure 2. The Seven Strategic Thrusts and Eight Critical Success Factors That Form the Basis of the Strategic Master Plan (CIDB 2007)

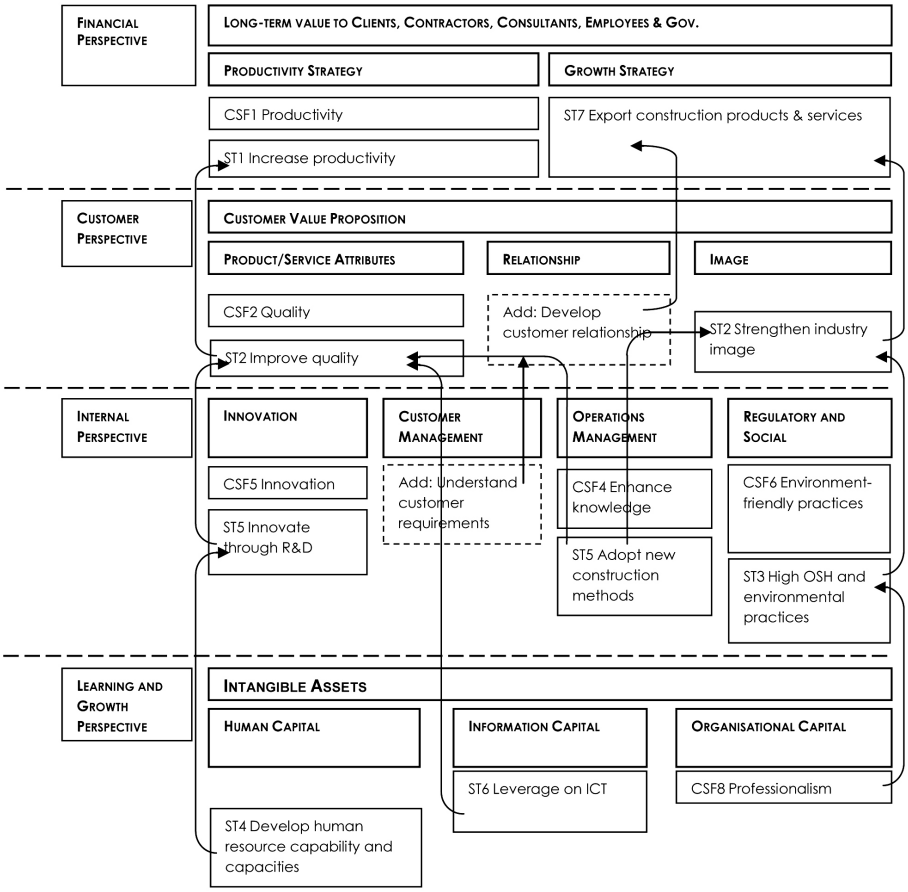
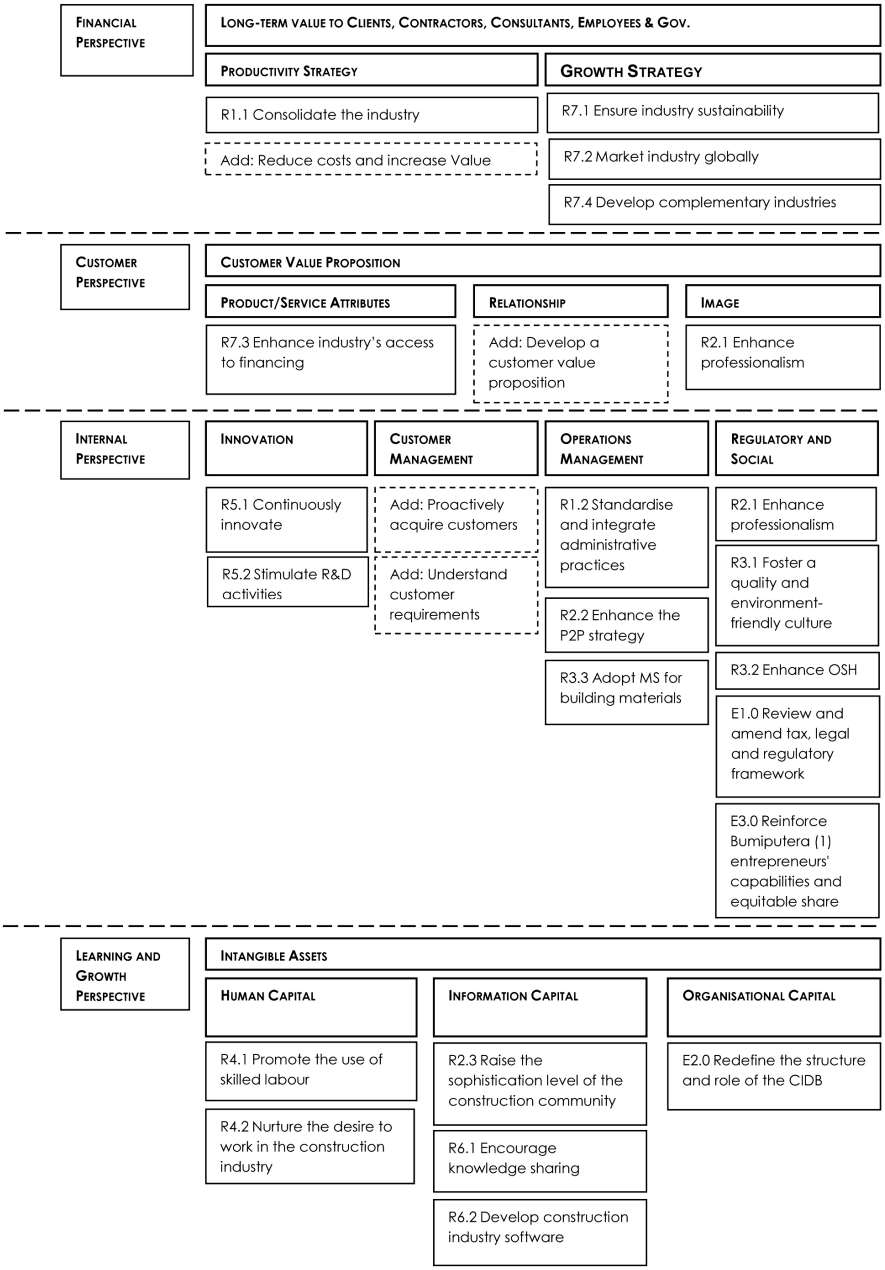


Figure 3. Proposed Strategy Map of the Critical Success Factors and Seven Strategic Thrusts



Note 1: 'Bumiputera' describes the Malay term embracing the indigenous people of the Malay Archipelago and can be translated literally as "sons of the soil".

Figure 4. Allocation of the 18 Recommendations and Three Enabling Recommendations Among the Four BSC Perspectives

In the *customer* perspective, the value proposition to construction industry clients is focused on only two parameters – quality (ST3) and image (ST2). It defines how the sector attracts, retains and deepens relationships with its customers. The value proposition is crucial because it helps the sector connect its internal processes to improved outcomes with its customers. The master plan has specifically put in place a strategy to improve quality through ISO certification and accreditation and the tightening of existing standards. The industry intends to improve its image by enhancing the professionalism (CSF8) of the industry with stricter registration requirements for contractors, greater specialisation and tighter monitoring of contractor performance. However, the overall customer strategy as described in the master plan lacks emphasis on the availability, range and functionality of the products offered and the quality of the relationships with customers. The construction sector has historically competed on the basis of price and would certainly need to pursue a strategy of developing partnerships with its customers, developing operational excellence or achieving product leadership. The industry will certainly benefit by encouraging a greater degree of partnering not just between the client and the contractor but, more importantly, along the entire construction value chain.

Once the industry has a clear picture of its customer and financial perspectives, it can then determine the means by which it will achieve the differentiated value proposition for customers and the productivity improvements needed to reach its financial objectives. The four key *internal processes* by which the construction industry creates value are operations management, customer management, innovation and regulatory and social processes. In the operations management area, the industry identified new construction methods (ST5), such as "industrialised building systems", as a way of enhancing efficiency, improving quality and reducing the reliance on manual labour. To encourage greater adoption of the industrialised building system, the CIDB has formulated an IBS Roadmap 2003–2010 (CIDB 2003), which was launched in 2003 but is reiterated here in the master plan as one of the main initiatives for increasing efficiency and productivity. The government has announced the provision of incentives in the form of levy exemptions to support the adoption of IBS (MOF, 2008).

In the area of customer management, no clear strategy has been presented in the master plan to attempt to understand the needs of local or overseas customers and the value proposition that these customers will find most appealing. Attributes that construction companies might inculcate to improve their customer management processes include the following: a deep and detailed knowledge of their customers, the offer of a total solution to the client, the offer of a solution that only they can provide, the feeling that they have succeeded only when the customer has attained success and the establishment of long-lasting relationships with their clients through which they can increase their share of the client's business by providing unparalleled levels of knowledge and solutions (Niven, 2006).

To sustain or build a competitive advantage, the industry must keep creating and bringing to market new products, services and processes. The strategy is in place to invest in research and development of innovative products and processes (ST5) in anticipation of customers' future needs. Thus far, the discussion of internal processes has focussed on what occurs within the industry. To complete this perspective, the sector must recognise that all organisations have

important stakeholders outside and beyond the industry. All construction industry organisations must strive to be good corporate citizens in the communities in which they operate, continually comply with all regulatory and social practices by adopting environmentally friendly practices and aim for a higher occupational health and safety compliance rate (ST3).

The foundation of the entire strategy is the *learning and growth* perspective, which defines the core competencies and skills, technologies and corporate culture needed to support the industry's mission. The construction industry has identified that all its workers, supervisors and managers need to be highly skilled and competent and has introduced training and accreditation schemes to develop these human resources (ST4) (CIDB, 2007). The sector intends to promote the use of information technology to share knowledge and implement online planning, approval, procurement and project management systems (ST6). In the area of organisational capital, the industry has emphasised the need to enhance professionalism (CSF8) by introducing performance monitoring for registered contractors, developing a code of ethics and conducting performance assessments and benchmarking against best practices. Niven (2006) clarified that the objectives in this perspective are really the "enabler" of the other perspectives and that motivated employees with the right mix of skills and tools operating in an organisational climate designed for sustaining improvements are the key ingredients in driving process improvements, meeting customer expectations and ultimately deriving financial returns.

The mapping of the strategy into these four perspectives (see Figure 4) illustrates that the human capital, technologies and corporate culture aspects of the learning and growth perspectives are predominantly in place to support the master plan. This ten-year master plan has identified that investing in the learning and growth perspective is the foundation for future improvements in the construction industry. It is worth noting that this review has identified a number of gaps in the master plan and recommends that these be addressed if and when a review is conducted in the future. Additional recommendations to address these shortcomings include initiatives to manage the customer in internal processes, developing customer relationships in the customer perspective and developing a clear productivity strategy to improve the industry cost structure and use assets more effectively. These are illustrated as dashed boxes in Figure 4.

Strategy Maps as a Communication Tool

Upon completing the review of the master plan, a strategy map of the strategic thrusts and critical success factors is created and linked with arrows indicating cause and effect or how each attribute in the learning and growth perspective contributes to operational improvements and how these in turn translate to the satisfaction of customer requirements. Stakeholders have indicated (CIDB, 2007) that long-term value to clients, contractors, consultants, employees is the main objective of the master plan and thus should be placed at the top of the strategy map, as shown in Figure 3. Niven (2006) has indicated that some organisations passionately believe that the *customer perspective* should be placed at the top of the strategy map instead of the financial perspective, lending further weight to the observation that the approach of the BSC is inclined towards the customer. Continuing with the theme of using the strategy map as a communication tool,

each of the strategic thrusts and critical success factors were aligned to the dimensions of each perspective to project a concise yet informative map of the strategies of the master plan. As such, the strategy map represents what the industry players must do well in each of the four perspectives to effectively execute the master plan. The arrows represent cause-and-effect relationships among the actions and objectives.

PERFORMANCE MEASUREMENT IN CONSTRUCTION

To gauge the performance of the construction industry over a range of its activities, an appropriate set of performance measures is required so that the stakeholders can monitor the industry's progress towards achieving its goals. Previous studies (Landin and Nilsson, 2001; Kagioglou, Cooper and Aouad 2001; Mohamed, 2003; Takim, Akintoye and Kelly 2003; Beatham et al., 2004; Bassioni, Price and Hassan, 2004; Lin and Shen, 2007; Nudurupati, Arshad and Turner, 2007; Yu et al., 2007) have mainly focused on evaluating project outcomes or company performance and were implemented primarily for the contractors, consultants and managers of construction projects. Other stakeholders, such as clients, suppliers, regulatory authorities and the community were not assessed or taken into account.

This section reports on the design of the performance measurement system from the selection of performance measures to coincide with the strategy map, the determination of target levels, the identification of sources of data and a proposed implementation plan. The computation of data for the baseline year was completed previously and reported elsewhere (Chan, 2009). The availability of these performance measures will allow the CIDB, the organisation primarily tasked to implement the master plan, with a framework for benchmarking and analysing the activities of the companies that comprise the construction industry.

Review of Other National Performance Measurement Initiatives

Five performance measurement initiatives, some implemented with the intent of establishing a benchmarking programme, were reviewed with the intent of adopting some of these measures for the Malaysian construction industry: the Key Performance Indicators (KPI) for the United Kingdom, the National Benchmarking System for the Chilean Construction Industry (NBS-Chile), the Benchmark Centre for the Danish Construction Sector (BEC), the New Zealand Construction Industry National Key Performance Indicators and the performance measurement program of the Canadian Construction Innovation Council.

Following the Latham Report (DOE, 1994) and the Egan Report (DTI, 1998) in the United Kingdom, the construction industry has developed its own set of key performance indicators (KPIs) to measure its performance. The Construction Best Practice Programme (CBPP), which was government funded, is recognised as the leading organisation in the production of KPIs within the industry and has been very successful in introducing many construction companies to the subject of performance measurement. The CBPP launched its ten headline KPIs in 1998. This effort has led to the formation of Construction Excellence, a new single

organisation, which aims to deliver improved industry performance, resulting in a demonstrably better built environment (Constructing Excellence, 2007).

The National Benchmarking system in Chile was developed in 2000 by the Corporation for Technical Development (CDT) of the Chilean Chamber of Construction and the Program for Excellence in Production Management at the Pontificia Universidad Catolica de Chile (GEPUC). The programme consists of two initiatives: devising and implementing performance measurements in the construction industry and establishing benchmarking clubs to compare performance. Performance indicators such as project cost and schedule deviations, subcontracting, labour efficiency, accidents, planning effectiveness, risk and productivity were proposed and computerised quantitative tools were provided for data analysis (Costa et al., 2006).

In 2006, the Benchmark Centre for the Danish Construction Sector (BEC, 2006) published a document to disseminate knowledge of their Construction Benchmarking System. The BEC, a commercial foundation established by organisations representing the entire Danish construction sector, has sufficient backing from the industry to rapidly implement this benchmarking at the national level. In August 2003, the Danish Government announced that, as part of its overall construction policy, construction benchmarking would be compulsory for projects in excess of 5 million Danish crowns (DKK). Since July 2005, Danish construction companies have had to present KPIs for previous projects if they wish to undertake construction projects for the Danish State.

The New Zealand Centre for Advanced Engineering (NZCAE, 2007) embarked on a pilot project in 2005 to develop and launch a national set of KPIs for the New Zealand construction industry. This was implemented because countries such as the UK have been able to demonstrate their year-on-year industry performance via a set of nationally recognised and supported KPIs. KPIs are used in the industry to provide a measurement framework for partnering and framework contracts, to provide evidence of best value in public procurement, to provide measures other than price to support procurement decisions, as a marketing tool, to meet the requirements of the ISO9001 quality management system and to provide a health check as part of a continuous improvement programme.

A study was initiated in 2005 by the Canadian Construction Innovation Council to support the measurement of the performance of the Canadian construction industry. The measures were established to cover aspects of cost, time, scope, quality, safety, innovation and sustainability and were selected to support benchmarking at the project, organisation and industry levels. A recent report on a pilot study (Rankin et al., 2008) indicated that, while cost, time, scope and safety information was readily available, the information for quality innovation and sustainability was not. The preliminary results were expected to become the basis of a broad benchmarking program.

These reviews have indicated that performance measures for the construction industry should include a combination of metrics for projects (time and cost target, quality, customer satisfaction), companies (profitability, turnover, return on capital) and the industry (safety, growth, labour productivity, innovation, training, construction demand).

Performance Metrics and Proposed Targets

The list of performance measures was selected to reflect the strategic thrusts in each of the four perspectives to ensure that the measures are explicitly linked to the strategy. A number of measures from other initiatives that were effective were included in this list. These measures are presented in line with the four BSC perspectives in Table 1.

These measures were defined and sources of data were identified and computed for the 2006 base year. A target was set for each measure by reviewing the derived data against benchmark data from other countries.

Implementation Issues

Based on the attempt to derive measures for the Malaysian construction industry and the review of the performance measurement and benchmarking initiatives in the UK, Chile, Denmark, New Zealand and Canada, some key issues for the design and implementation of these systems are apparent. First, the establishment of an industry-wide performance measurement system and incorporation of those measures into the entire industry requires a fairly intense effort. The responsibility for data collection, processing and analysis is not well defined at this stage, although existing sources of data have been identified. The implementation of this initiative demands a joint effort from several government agencies, construction clients, individual construction companies, research institutions and industry organisations. Several issues regarding the lack of data and inconsistencies in some published information have surfaced: (1) there is no published data for some measures (project cost and time predictability, labour productivity, contractor performance, approval time, client satisfaction, training and staff turnover), (2) the number of workers in the construction industry was reported as 400,000 in the Survey of Construction Industries 2005 (DOS, 2006) but recorded as 800,000 in the Labour Census Report 2004 (DOS, 2008), although both documents were published by the same organisation and (3) the small number of samples for some parameters would not give a representative report of the actual performance. The requirement for a consistent, accurate and validated set of data from reliable sources cannot be over-emphasised.

In the discussions that followed from the presentation of the early draft of the performance measures, it became apparent to the CIDB that the responsibility to overcome these shortcomings falls within their efforts to implement the master plan. Significant efforts would have to be expended to convince the industry stakeholders to report the necessary project and company information to the CIDB. Presently, the regulations only require the registered construction companies to supply the following information: project values when projects are awarded, company certifications and worker training, accreditation and registration. Additional information regarding productivity, company profitability, project performance, customer satisfaction and staff training and turnover will be required to ensure that the performance measurement program is carried out effectively and successfully. An excellent example of a mature program for reporting key performance indicators and benchmarking initiatives in the UK is reported each year in Construction Statistics Annual (ONS, 2009).

Table 1. Proposed List of Performance Measures, Sources of Data and Suggested Targets

Item	Performance Measures	2006 Base Year	Source	Phase 1 (2006–2008)	Phase 2 (2009–2012)	Phase 3 (2013–2015)
	Financial Perspective					
1.1	Annual construction demand from public sector	RM 21.5 billion	CIDB Data	–	RM 60b	RM 75b
1.2	Annual construction demand from private sector	RM 37.5 billion	CIDB Data	–	(Total)	(Total)
1.3	Ratio of value of contracts awarded to Malaysian contractors vs foreigners	93%	CIDB Data	80% & above	80% & above	80% & above
1.4	Total annual value of overseas construction projects	RM 30 billion	CIDB Data	RM 13 billion	RM 25 billion	RM 45 billion
1.5	Productivity – Value-add per worker (RM per worker)	RM 35,240	DOSM			
1.6	Productivity growth rate (annual change in productivity)	2.63% (2005)	DOSM	3%	4%	5%
1.7	Profitability – Company (revenue as a percentage of sales)	9.8% (mean)	CIDB Survey	Report		
1.8	Return on equity (revenue as percentage of equity)	7.7% (mean)	CIDB Survey	Report		
	Customer Perspective					
2.1	Predictability Cost – Design (% on target)	No data	CIDB Survey	Report		
2.2	Predictability Cost – Construction (% on target)	No data	CIDB Survey	Report		
2.3	Predictability Cost – Project (% on target)	No data	CIDB Survey	Report	30%	50%
2.4	Predictability Time – Design (% on target)	No data	CIDB Survey	Report		
2.5	Predictability Time – Construction (% on target)	No data	CIDB Survey	Report		
2.6	Predictability Time – Project (% on target)	No data	CIDB Survey	Report	30%	50%
2.7	QLASSIC score	60	CIDB Data	Report	70	80
2.8	Time for Approvals (weeks)	No data	CIDB Survey	Report	Report	Report
2.9	Performance Ratings	No data	CIDB Survey	Report	Report	Report
2.10	Client Satisfaction – Products and Services	No data	CIDB Survey	Report	Report	Report

(*continued on next page*)

Table 1 (*continued*)

Item	Performance Measures	2006 Base Year	Source	Phase 1 (2006–2008)	Phase 2 (2009–2012)	Phase 3 (2013–2015)
	Internal Perspective– Innovation					
3.1	Construction R&D per RM 1m of project value	RM120 (est.)	CIDB-CREAM	RM 120	RM 240	RM 360
3.2	Percentage of IBS/pre-cast/pre-fabrication	–	CIDB Data	Report		
3.3	Number of patents registered locally	197	MyIPO	Report		
	– Operations					
3.4	Labour productivity (man-days per sq. m of completed works)	No data	CIDB Survey	Report		
3.5	Labour productivity growth rate (annual change in productivity)	No data	CIDB Survey	2%	3%	3%
3.6	Number of construction companies with ISO 9001 certification	375 (2007)	CIDB Data	G7 – 100%	+G6, G5 – 50%	+G6, G5 – 70%
3.7	Number of construction companies with ISO 14001 certification	2 (2007)	CIDB Data	Report		
3.8	Number of construction companies with OSHMS/OHSAS certification	6 (2007)	CIDB Data	Report	G7-30% G7-30%	G7-50% G7-50%
3.9	**– Occupational Health and Safety**	915 (2005)	SOSCO	–		
3.10	Number of accidents (per 100,000 workers)	18 (2005)	SOCSO	–	700	450
	Employee fatality (per 100,000 workers)				13	8
	Learning and Growth Perspective					
4.1	Workers accreditation by CIDB (Accredited/Registered)	27,797	CIDB Data	Report		> 95%
4.2	Supervisors accreditation by CIDB (Accredited/Registered)	411	CIDB Data	Report		> 95%
4.3	Staff turnover	No data	CIDB Survey	Report		
4.4	Number of training days per worker per year	No data	CIDB Survey	Report	1	2
4.5	Total ICT spending of the construction industry (per RM 1m of project value)	RM 505	DOSM	+ 50%	+ 50%	+ 50%
4.6	Inputs from the ICT industry to the construction industry	RM 254 million	DOSM	+ 50%	+ 50%	+ 50%

Although a range of measures has been proposed, the list is by no means complete or exhaustive but a balance between expedient implementation of the initiative and the measurement of many parameters. The draft list of measures has been designed to cover all four perspective of the balanced scorecard with equal weight. As discussed above, the measures in the financial and customer perspectives are all lagging measures or outcomes, whereas the measures in the internal and learning and growth perspectives help identify improvement opportunities and point towards management interventions. In parallel, the list of measures for the industry necessarily encompasses measures derived from both projects and companies, as construction is a project-oriented industry in which each project is unique in terms of design, site conditions, team members and suppliers. This list of measures shall be reviewed periodically to ensure that the measures remain relevant to the appropriate perspectives and that the data remain comparable with those obtained from different countries.

In general, the successful implementation of this performance measurement initiative will lead to the development of benchmarking initiatives in which project, company and industry performance are compared against the best performances in other sectors of the economy and/or other countries. In the final analysis, a performance measurement system is of no value if it is not used as a guide to management decisions. The feedback loop and consequent decision making based on these measures are necessary to convert the measurement system into a management system. Failure to take action and manage with data will severely curtail the potential for achieving performance improvement.

CONCLUSIONS

A review of the strategic initiatives of the construction industry master plan to transform the industry into a "world-class, innovative and knowledgeable global solution provider" has been conducted by adopting the BSC approach. This study has pointed out that the critical success factors and strategic thrusts have covered all four perspectives of the BSC with a strong emphasis on the Learning and Growth perspective but are deficient in their focus on customer management. Additional recommendations to cultivate customer relationships and execute internal processes to acquire and deepen an understanding of customer requirements are suggested. A strategy map of the critical success factors and strategic thrusts clearly illustrates the cause-and-effect relationships between each thrust within the four perspectives. The link between developing employee capabilities and greater innovation, improved building quality, and, eventually, increases in productivity can be clearly seen in the strategy map. Another chain of cause-and-effect between acquiring customers and enhancing customer intimacy, leading to growth in the bottom line, is suggested. The proposed strategy map describes how the industry will achieve its desired outcome of satisfying customers, employees and stakeholders.

A draft list of key performance measures for the Malaysian construction industry has been identified with a clear association between the strategic thrusts and the performance measures. Data for the 2006 base year were derived from various sources and have been presented here to serve as the basis for future comparisons.

The CIDB will be expected to play a central role in this performance measurement framework. A large number of performance measures are not currently available and will have to be determined by surveys conducted by the CIDB.

Possible subsequent tasks or enhancements to the performance management framework include cascading the BSC down to each and every organisation in the construction industry to ensure that all stakeholders are pursuing goals that are consistent with the achievement of the CIMP strategy. Additionally, the BSC can be used to effectively drive the strategic allocation of resources by the CIDB or other implementation agencies.

REFERENCES

Bassioni, H.A., Price, A.D.F. and Hassan, T.M. (2004). Performance measurement in construction. *Journal of Management in Engineering (ASCE)*, 20(2): 42–50.

Beatham, S., Anumba, C., Thorpe, T. and Hedges, I. (2004). KPIs: A critical appraisal of their use in construction. *Benchmarking*, 11(1): 93–117.

The Benchmark Centre for the Danish Construction Sector. (2006). *Benchmarking Danish Construction*. Copenhagen: BEC.

Chan, T.K. (2009). Measuring performance of the Malaysian construction industry. *Construction Management and Economics*, 27(12): 1231–1244.

Constructing Excellence. (2007). *Key Performance Indicators KPI Management Tool*. London: Constructing Excellence in the Built Environment.

Construction Industry Development Board. (2007). *Construction Industry Master Plan Malaysia 2006–2015*. Kuala Lumpur: CIDB.

———. (2003). *IBS Road Map 2003–2010*. Kuala Lumpur: CIDB.

Costa, D.B., Formoso, C.T., Kagioglou, M., Alarcon, L.F. and Caldas, C.H. (2006). Benchmarking initiatives in the construction industry: Lessons learned and improvement opportunities. *Journal of Management in Engineering (ASCE),* 22(4): 158–167.

Deming, W. E. (1986). *Out of the Crisis*. Cambridge: Massachusetts Institute of Technology Center for Advanced Engineering Study.

Department of Environment. (1994). *Constructing the Team: Final Report of the Government/Industry Review of Procurement and Contractual Arrangements in the UK Construction Industry*. London: The Stationery Office.

Department of Statistics. (2008). *Laporan Penyiasatan Tenaga Buruh Separuh Tahun Pertama 2008 Malaysia*. Series 4, No. 3. Malaysia: Department of Statistics.

———. (2006). *Survey of Construction Industries 2005*. Malaysia: Department of Statistics.

Department of Trade and Industry. (1998). *Rethinking Construction: The Report of the Construction Task Force*. London: Department of Trade and Industry.

Kagioglou, M., Cooper, R. and Aouad, G. (2001). Performance management in construction: a conceptual framework. *Construction Management and Economics*, 19(1): 85–95.

Kaplan, R.S. and Norton, D.P. (2004). *Strategy Maps: Converting Intangible Assets into Tangible Outcomes*. 1st edition. Boston: Harvard Business School Press.

———. (1992). The Balanced Scorecard: Measures that drive performance. *Harvard Business Review*, 70(1): 71–79.

Landin, A. and Nilsson, C.H. (2001). Do quality systems really make a difference? *Building Research and Information*, 29(1): 12–20.

Lin, G. and Shen, Q. (2007). Measuring the performance of value management studies in construction: Critical review. *Journal of Management in Engineering (ASCE)*, 23(1): 2–9.

Mettanen, P. (2005). Design and implementation of a performance measurement system for a research organisation. *Production Planning and Control*, 16(2): 178–188.

Michalska, J. (2005). The usage of the Balanced Scorecard for the estimation of the enterprise's effectiveness. *Journal of Materials Processing Technology*, 162–163: 751–758.

Ministry of Finance. (2008). *Treasury Circular No.7 2008 Pelaksanaan Industrialised Building System (IBS) dalam Projek Kerajaan.* Putrajaya: Ministry of Finance.

Mohamed, S. (2003). Scorecard approach to benchmarking organisational safety culture in construction. *Journal of Construction Engineering and Management (ASCE),* 129(1): 80–88.

Niven, P.R. (2006). *Balanced Scorecard Step-by-Step: Maximising Performance and Maintaining Results*. 2nd Edition. New Jersey: John Wiley and Sons.

Nudurupati, S., Arshad, T. and Turner, T. (2007). Performance measurement in the construction industry: An action case investigating manufacturing methodologies. *Computers in Industry*, 58(7): 667–676.

New Zealand Centre for Advanced Engineering. (2007). *The New Zealand Construction Industry National Key Performance Indicators: Handbook and Industry Measures 2006 Data*. Christchurch: New Zealand Centre for Advanced Engineering.

The Office of National Statistics. (2009). *Construction Statistics Annual 2009*. Hampshire: Macmillan Publishers Limited.

Peinaar, H. and Penzhorn, C. (2000). Using the Balanced Scorecard to facilitate strategic management at an academic information service. *Libri*, 50: 202–209.

Rankin, J., Fayek, A.R., Meade, G., Haas, C. and Manseau, A. (2008). Initial metrics and pilot program results for measuring the performance of the Canadian construction industry. *Canadian Journal of Civil Engineering*, 35(9): 894–907.

Shewhart, W. A. (1986). *Statistical Method from the Viewpoint of Quality Control*. New York: Dover.

Stewart, R.A. and Mohamed, S. (2003). Evaluating the value IT adds to the process of project information management in construction. *Automation in Construction*, 12(4): 407–417.

Takim, R., Akintoye, A. and Kelly, J. (2003). Performance measurement systems in construction. In D.J. Greenwood (ed.). *19th Annual ARCOM Conference*. Volume 1. University of Brighton, Association of Researchers in Construction Management, 3–5 September 2003. Reading: Association of Researchers in Construction Management, 423–432.

Tjahjadi, B. (2007). The implementation of the Balanced Scorecard to improve competitive advantage in the era of globalisation: Case study at local hospital organisations in Surabaya-Indonesia. *Proceedings: 13th Asia Pacific Management Conference*. Melbourne: Asia Pacific Management Review, 376–386.

Yu, I., Kim, K., Jung, Y. and Chin, S. (2007). Comparable performance measurement system for construction companies, *Journal of Management in Engineering (ASCE),* 23(3): 131–139.