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Performance measurement of construction firms in developing countries

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Many large contractors in Vietnam are lacking an effective method to measure their performance and identify weaknesses and threats. The integration of the balanced scorecard (BSC) and strengths-weaknesses-opportunities-threats (SWOT) matrix is described to evaluate the strategic performance of large contractors in Vietnam. The AnGiang Construction Company (ACC) was used as an example to validate the approach. The BSC-oriented SWOT matrix is developed to formulate the short- and long-term strategies of ACC. The benchmarking approach was adapted to evaluate the ACC's performance and expose its competitors' best practices for improvement. The results indicated that only the financial perspective is at a poor level on the performance scale whereas the customer, learning and growth, and internal process perspectives are at a moderate level on the performance scale. The effective evaluation matrix uncovered 11 effective solutions that could be grouped under four categories: (1) innovating organizational structure; (2) effectively managing processes at construction sites; (3) stepping up cost control; and (4) improving equipment management. The findings may benefit not only Vietnamese construction firms but also firms in other developing countries to identify their strategies, quantify the strategic performance, and improve their competitive advantages.

Keywords: Balanced scorecard (BSC), construction companies, SWOT analysis, performance measurement, Vietnam.

Introduction

Many construction firms have been unsuccessful in their business for the past 10 years. The construction environment becomes riskier in developing countries (Ezeldin and Sharara, 2006); therefore, construction firms must periodically measure their performance and compare with their past performance in order to find out what should be improved (Gupta, 2004). Many large construction contractors in Vietnam are lacking an effective method to evaluate their strengths and weaknesses and to measure their performance. As a result, it is very difficult to raise their position in the dynamic marketplace. Moreover, the presence of a large number of foreign construction firms during the past four years has engendered severe competition among domestic contractors (Cao, 2006). For these reasons, the development of effective methods is very necessary to identify the Vietnamese large-scale contractor's weaknesses and threats from the external environment as well as to measure their strategic management performance.

By applying the balanced scorecard (BSC) and strengths-weaknesses-opportunities-threats (SWOT) matrix, the strategic management performance of a large construction firm in Vietnam, a new member of the WTO with a promising economy, can be measured and evaluated to seek continued improvements. The AnGiang Construction Company (ACC) was used as a typical case to validate the approach. The ACC's strategic management performance was also compared with its competitors to seek the best practices for its improvement. Though the research question seems to be localized, the conceptual research framework has general use. Therefore, the findings are expected to be

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beneficial not only for Vietnamese construction firms but also for firms in other developing countries.

The major objectives of the research are to:

(1) implement a SWOT matrix for the analysis of strengths, weaknesses, opportunities and threats so as to formulate the strategies of a typical construction firm, i.e. AnGiang Construction Company (ACC);
(2) identify and validate key performance indicators (KPIs) for monitoring and evaluating the performance of ACC;
(3) measure the strategic performance of ACC based on identified KPIs so that the reasons for success or failure could be systematically identified and then compare with competitors' performance in order to expose best practices for improvement.

Literature review

The literature review comprises three sections: background to strategic performance measurement, balanced scorecard (BSC), and previous studies on organizational performance measurement in construction industry.

Background to strategic performance measurement

It is widely accepted that strategy intensively involves performance to attain goals. However, 'goals without performance measures do not motivate managers' (Chaichan, 2002). Without strategic performance measurement, an organization may meet serious difficulties in managing its strategy because of no actual data for comparison with organizational objectives. The purpose of strategic performance measurement is: (1) to set direction and motivate managers; (2) to help top managers identify critical processes and critical success factors (CSFs). A critical process is a series of activities that directly affects the achievement of organizational goals (Chaichan, 2002). Identifying CSFs is the next step to drive the organization towards its goals. 'CSFs are the limited number of areas in which satisfactory results will ensure successful competitive performance for the organization' (Mard *et al.*, 2004). A set of CSFs depends on the company's strategy and is usually less than 10 factors in any company (Mard *et al.*, 2004). There are different performance indicators that may affect a CSF. However too many factors can be unmanageable, thus management has to select appropriate key performance indicators (KPIs) for each CSF. 'The art of selecting KPIs requires that management understand how the CSFs and their KPIs are significant components of the company's corporate strategy' (Mard *et al.*, 2004). The main purpose of KPIs is to measure organizational performance (Chan and Chan, 2004).

Continuous efforts have been undertaken to develop methods for performance measurement. The following paragraphs will outline the development of a salient performance measurement method in the later part of the 20th century. Traditionally, most organizations assess their performance based on financial and accounting measures such as return on investment (ROI), discounted cash flow (DCF), profit margins and so on. However, financial measures concentrate on past performance, thus managers have insufficient information to make decisions. Three salient limitations of traditional measures are: (1) focusing on the past, which does not reflect current value-added actions (Kaplan and Norton, 1992); (2) failing to include other critical factors such as customer satisfaction, employee satisfaction, and the quality of products (Parker, 2000); (3) describing only one perspective of an organization's performance, becoming out of date and focusing only on the short term (Stone, 1996). Since traditional measures are inadequate to address many issues that businesses should be concerned with (Amaratunga *et al.*, 2001), a distinct need has emerged for the development of other methods for the incorporation of both financial and non-financial measures.

Performance measurement (PM) frameworks can be found in different journals and technical reports. Bourne *et al.* (2000) presented the following PM frameworks. Bitton (1990) proposed an approach to attach appropriate performance measures to decisions of breaking down the planning and control of manufacturing. Dixon *et al.* (1990) developed the special questionnaire, namely the performance measurement questionnaire (PMQ), for identifying strengths and failings in the current PM system and then proposing a set of performance measures. Eccles and Pyburn (1992) used a facilitated process to build a performance model linking changes in human knowledge and organizational processes. Neely *et al.* (1996) developed a management process to reassess the strategy of companies and to manage the review of the final set of performance measures. Parker (2000) briefly reviewed the other modern PM frameworks, i.e. benchmarking, BSC and activity-based costing (ABC). As the predecessor of BSC, the Tableau de Bord and the performance matrix emphasized the vital importance of the balance between financial and non-financial aspects in PM (Todd, 2000). The Table de Bord, a concept popularized in France, looks for ways to improve the production process by better understanding the

cause–effect relationships (Epstein and Manzoni, 1998), while the performance matrix summed and computed the weightings to measure performance indices.

Balanced scorecard (BSC)

Kaplan and Norton (1996) introduced the balanced scorecard, which is 'a management system that enables organizations to clarify their vision and strategy and translate them into action' (BSC Institute, 2006a). The BSC framework allows most organizations to look at their performance from four perspectives: (1) financial: 'How do we look to our shareholders?'; (2) customers: 'How do our customers see us?'; (3) innovation and improvement: 'How can we continue to improve our processes?'; and (4) internal processes: 'What must we excel at?' (Parker, 2000). The BSC framework provides a balance between economic and operating performance (Amaratunga *et al.*, 2001), financial and customer outcomes, and short- and long-term objectives of an organization. The BSC also provides leading and lagging indicators to evaluate congruence between the performance of an organization and its strategic goals (Kagioglou *et al.*, 2001) and results in a better indication of an organization's performance than merely financial measures (Hepworth, 1998). Moreover, BSC also supports strategic planning, transforms the strategic plan for the organization on a daily basis, provides performance measurements, helps planners identify what should be measured and enables executives to truly execute their strategies (BSC Institute, 2006b).

However, BSC is not a magic tool, 'it is somewhat difficult and time-consuming to implement a comprehensive balanced scorecard system in a large organization. Do not embark on a balanced scorecard initiative unless your organization has a high-ranking champion, has adequate funding, and is ready to meet the challenges of change' (BSC Institute, 2006b). As a result, long-term top management commitment is required to keep up the BSC system. The BSC is not without weaknesses. Common weaknesses are ignoring the market perspective, the absence of any mention of suppliers, and disregard for the human element (DeWaal_pages, 2002). Moreover, the BSC concept can be hard to implement and has failed in certain circumstances. Neely and Bourne (2000) identified two main reasons for the failure of measurement systems: inappropriate design of measurement systems and difficulties during the implementation phase. Other reasons for the failure of the BSC concept can be found in other published works (Epstein and Manzoni, 1998; Schneiderman, 1999; Lee and Ko, 2000; Lee *et al.*, 2000; Amaratunga *et al.*, 2001; DeWaal_pages, 2002).

Previous studies on organizational performance measurement in the construction industry

Continuous research efforts have been undertaken to measure performance in the construction industry. Kagioglou *et al.* (2001) proposed a performance measurement process framework (PMPF) which can be adapted for any organization. The PMPF is a conceptual framework based on the BSC with the addition of two perspectives, namely 'project' and 'supplier'. Stewart and Mohamed (2001) developed the BSC framework allowing for the measurement of IT/IS performance. The writers used a project tier example to illustrate the application of the proposed framework. Samson and Lema (2002) presented a conceptual PM framework and proposed a set of effective indicators for Tanzanian contractors. Costa and Formoso (2003) proposed a framework to identify gaps and best practices in the PM system which is compatible with the construction firms' strategy in Brazil. The researchers provided guidelines for the implementation and use of PM systems. Salminen (2005) developed a system for measuring construction site performance. The researcher analysed the measurement results to determine the success factors for a construction site.

It was noted that there are different applications of KPIs in construction. The following are the varied applications of KPIs in recent years. Chan and Chan (2004) developed a set of KPIs to measure success of construction projects. The researchers used three cases to test the validity of the proposed KPIs. Beatham *et al.* (2004) suggested a framework for a performance measurement system including all types of measures and aligning to the company's strategies and objectives. Shohet (2006) proposed a set of KPIs for the tactical maintenance management for healthcare facilities.

KPIs were also applied to measure and evaluate the performance of various projects and departments. Wongsamut (2002) used KPIs to evaluate the performance of a water resource development project in Thailand. Welker (2002) applied KPIs to measure the performance of a training project. Chaichan (2002) used KPIs to measure and evaluate the performance of a construction department of Thai investors. In Vietnam, Khanh (2005) and Cao (2006) applied KPIs to measure the performance of an engineering department and the contractor, respectively. The whole performance of the above department and contractor was at only a moderate level in each case, whereas according to financial measurements it was at a good level.

The above literature implies that little effort has been devoted to the application of BSC for measuring strategic performance of construction firms in developing countries where the construction industry contributes considerably to the economy's growth rate.

Brief overview of the Vietnamese construction market (VCM)

The purpose of this section is to clarify the representativeness of the sample chosen (i.e. ACC). This section starts with a comprehensive description of the salient characteristics of the VCM.

First, the VCM depends heavily on foreign and government orders in a segment of industrial plants (i.e. processing plants, electricity power plants, petroleum and gas disposal facilities, and so on) and infrastructure projects, with private orders in other segments. This is because labour-intensive construction is mostly given to domestic firms while plant and infrastructure construction, which needs high technology, depends on foreign investors due to domestic construction firms' lack of supply capability. Lack of capital may be a barrier to domestic orders from the private sector.

Second, the market is mainly controlled by large and medium construction firms. There is no official definition of construction firms by size in Vietnam, thus we define a construction firm as: small when its capital is less than or equal to 5 billion VND ($US1.00 ≈ VND 16 228); medium when its capital is between 5 billion VND and 50 billion VND; and large when its capital is 50 billion VND or more. As shown in Appendix 1, the proportions of firms in terms of size are: small: 74%, medium: 20%, large: 6%. However, outputs of medium and large construction firms (i.e. net revenue) contributed 89% of the total revenue of the construction sector.

Third, the construction orders may differ from region to region. The construction orders are allocated around large cities such as Hanoi, Ho Chi Minh city, and industrial zones because of the differences in economic growth.

Fourth, the central government and provincial authorities are major customers for large projects. As a result, close and cooperative relations with local government and ordering authorities are essential to achieve more orders.

Fifth, there is a sharp increase in construction demand because of the promotion of industrialization and official development assistance (ODA). Competitiveness in the VCM is greatly influenced by the capability of capital supply. Therefore, it strongly requires construction firms with financial capacity.

In order to assist readers, Appendix 1 also shows some key indicators of the construction output at national level. The Vietnamese construction industry (VCI) has accelerated in the past decade with growth in scale and quantity of output. However, the industry has faced many problems such as the complexity of the legal and institutional framework, lack of capable consultants and domestic contractors for handling large projects (Long *et al.*, 2004), poor change management, bureaucracy of several local authorities, fraudulent practices, and kickbacks. Recently, the VCI has been satisfied with the growth in quantity thanks to low construction prices and cheap manpower, and has neglected to remain competitive in a fast-changing construction environment.

Research methods

The research method framework of this study consists of four steps: (1) corporate strategy formulation; (2) KPIs development; (3) KPIs validation; and (4) the measurement of the business strategic performance (Figure 1).

Corporate strategy formulation

Since clarifying the company vision and strategy is a first step of the actual implementation of the BSC (Kaplan and Norton, 1996), identifying internal and external factors is regarded as the study initial step. Based on information from the comprehensive interviews of top management as well as the review of ACC's documents, 26 internal factors and 17 external factors influencing the ACC's success were preliminarily identified. Twenty-three top and middle managers, who worked for ACC more than 15 years, were asked to evaluate the influential level of factors on the success of the company using a five-point Likert-type scale (from 1=no effect to 5=great effect). This resulted in significant internal and external factors which were considered as inputs to analyse the SWOT matrix in the next step. Since SWOT analysis creates strategies that make sense (Lee *et al.*, 2000), the ACC's long-term strategy was translated into specific objectives and short-term strategies through a SWOT analysis which was conducted by interviewing five top managers. These strategies were used as a guideline to develop preliminary KPIs based on the BSC framework. Table 1 presents the SWOT matrix of ACC including eight objectives which resulted from the following four integrations between: (1) strengths and opportunities (S/O); (2) strengths and threats (S/T); (3) weaknesses and opportunities (W/O); and (4) weaknesses and threats (W/T). According to the BSC framework, the ACC strategy needs to translate into four perspectives: financial, customer, internal business process, and learning and growth perspectives. The results of the translation are sources to draw a strategic relationship map in the next stage.

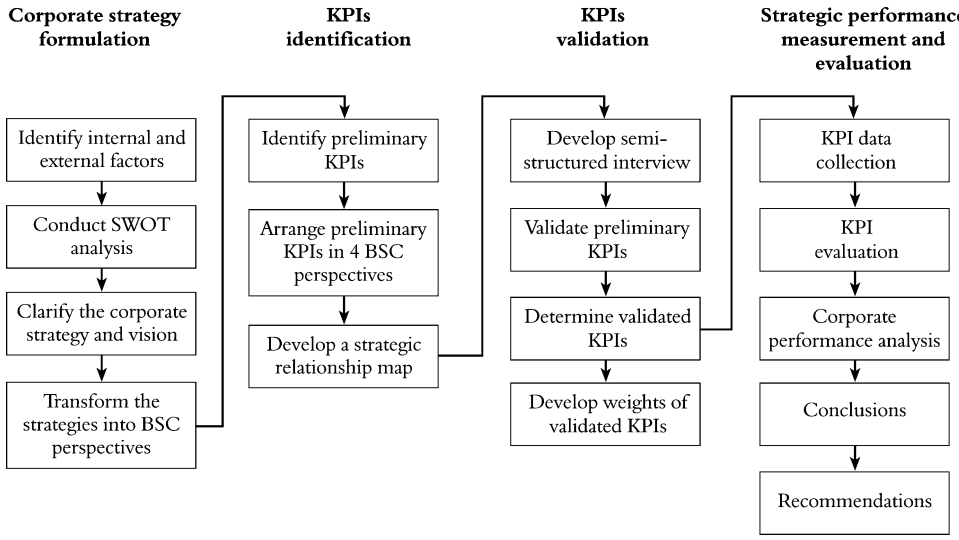


Figure 1 The research method framework

KPIs development

The main purpose of this step is to identify the appropriate KPIs corresponding with the ACC strategic objectives. According to the characteristics of an effective KPI which were proposed by Išoraitė (2004), 27 preliminary KPIs were identified through SWOT analysis results and executive interviews. Based on the BSC framework, strategic objectives and preliminary KPIs were arranged in the area of each perspective. This resulted in a strategic map (Figure 2) which helps the relative management identify relationships in terms of cause and effect between KPIs and company objectives (Chaichan, 2002). In the strategic map, KPIs must display a direct or indirect relationship with strategic objectives, and they must respond to strategy and overall mission of the organization (Welker, 2002). Based on the strategic map, managers identified and eliminated KPIs that had no relation to corporate strategic performance, as well as adding other KPIs.

KPIs validation

In order to maximize their reliability, KPIs were thoroughly verified so that only validated KPIs were used for measuring the strategic performance. Since the interviews are suitable for differing information requirements (Crouch and Housden, 2003), semi-structured interviews were carried out to evaluate the degree of applicability and importance of each KPI. The validated KPIs must obtain agreement of at least 50% on applicability to measure the strategic performance. Table 2 presents 30 validated KPIs in which three KPIs are added by interviewees who were top and middle managers of ACC. It is important to identify the weight of each KPI contribution to each perspective. The weight is mainly derived from respondents' perception regarding the importance of each KPI (5 is the most important and 1 is the least important).

Measuring the business strategic performance

KPI data collection is an initial activity of this step. The verification of each validated KPI by type of data, source of data, and data formulation is a top priority in order to gain meaningful data. The interviews with the managers of all departments were conducted to get the consultation about verifying KPIs. Moreover, in order to raise the effectiveness of the data collection, the data collection method of each validated KPI was evaluated by the management of ACC. Three ways of data collection are personal interviews, company documentations, and project site recording. Based on the collected data, two top managers were asked to evaluate each KPI using a five-point Likert-type score (5=excellent, 4=good, 3=moderate, 2=poor, and 1=very poor). Evaluators applied an external benchmarking approach to evaluate KPIs and then identify what should be improved. Since external benchmarking is the comparison with competitors in the same industry (Kozak and Rimmington, 1998), evaluators were asked to identify their competitors. Two competitors are the Construction Corporation 4 (CC4) and the AnGiang Real Estate Company (AREC). Fortunately, the vice directors of each competitor agreed to take part in interviews for data collection. During the evaluation process, appraisers had to analyse and evaluate through their personal judgements of some KPIs with no available data.

Table 1 SWOT matrix of AnGiang Construction Company (ACC) (adapted from Lee and Ko, 2000)

	Strength (S)	Weakness (W)
	S1: Board of directors having experience, good relations with customers	W1: Backward technology and equipment
	S2: The company has fine goodwill	W2: Lack of comprehensive measures to manage for the overall operation of the company
	S3: The company has the competitive advantage on bidding prices	W3: Lack of promising technical personnel
	S4: The technical staff have several years of experience in civil works	W4: Ineffective utilization of invested capital
Opportunity (O)	S/O	W/O
O1: An increase in the invested capital of all sectors	(C) SO-1: Keep and radically exploit the traditional market (O1, O2, S1, S2, S3, S4)	(I) WO-1: Equip modern construction machines in order to meet customer needs (O1, O2, W1)
O2: The high growth rate of Vietnamese economy	(C) SO-2: Expand the business to other regions and segmentations (O1, O2, O3, S3, S4)	(I) WO-2: Develop quality management system (QMS) and total quality management (O1, O2, O4, W2)
O3: Legal modifications relating the construction industry		(L) WO-3: Draw competent human resources and speed up in-house training (O1, O2, O4, W3)
O4: Vietnam becomes a member of WTO		(I) WO-4: Improve management of receivable accounts (O1, O2, O3, W4)
Threats (T)	S/T	W/T
T1: Late payments for completed works by owners T2: Unsound competitions in construction bidding T3: Extreme competitiveness in the construction market T4: The growth of private construction firms	(I) ST-1: Step up marketing and advertising activities (T1, T3, S1, S2, S3, S4)	(F) WT-1: Carefully evaluate customers to avoid projects with the unavailable budget (T1, W4)

Notes: F=Financial perspective, C=Customer perspective, I=Internal process perspective, L=Learning and grow perspective.

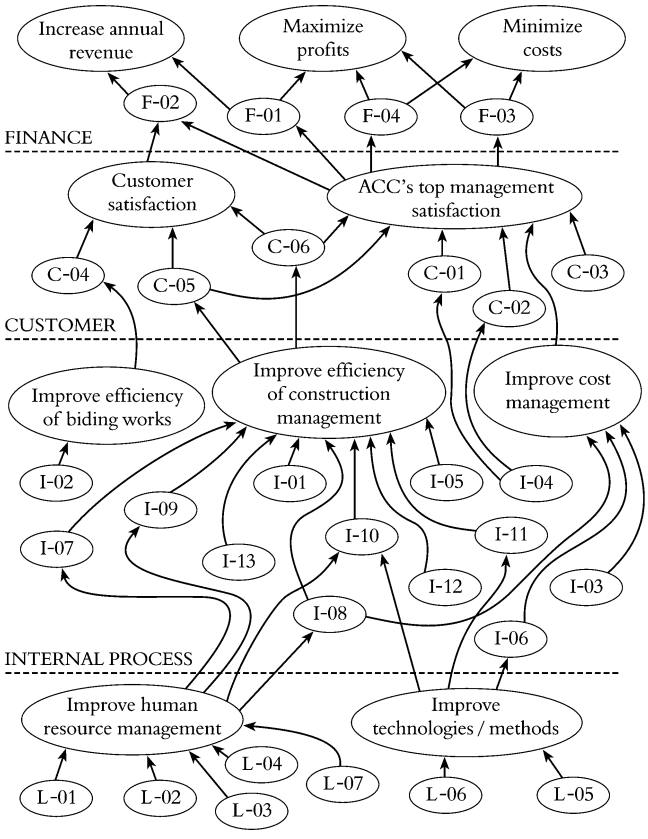
The corporate performance analysis is the next activity to analyse the strategic performance and to identify the strengths and weaknesses of ACC. According to the mark and the weight of each KPI, the performance scale of ACC was calculated based on the performance scale of each KPI. Adopting previous studies (Chaichan, 2002; Khanh, 2005), five levels of the performance scale are: (1) 40% or less for very poor; (2) 40% to 60% for poor; (3) 60% to 80% for moderate; (4) 80% to 90% for good; and (5) 90% or more for very good.

Results and discussion

SWOT matrix of the AnGiang Construction Company (ACC)

The sources for identifying strengths, weaknesses, opportunities and threats of the SWOT matrix came from significant factors that affected ACC's performance. As shown in Table 1, the significant strengths of ACC were its chief executive officers (CEOs) with wide experience and close customer relations. Owing to the distinct characteristics of the VCM, the role of CEOs is more important to achieve success in construction firms. Since the Vietnamese government investment in the construction sector has reached approximately 35% of GDP for the whole five-year period 2001–05 (Cao, 2006), the Vietnamese government is the biggest customer of the construction industry. Thus a close relationship of CEOs with governmental institutions will help construction firms gain competitive advantages over others. In contrast, the significant weaknesses of ACC were: obsolete technology and equipment, and lack of comprehensive measures to manage for the overall operation of the company.

A significant threat of ACC is late payments by owners for completed contract works. As in most developing countries, large projects in Vietnam are financed through government agencies' funds; delay in



Notes: F-01, L-02, I-03, C-04, *and so on* . . . are the codes of KPIs

Figure 2 The strategic relationship map of AnGiang Construction Company (ACC)

payment for accomplished works is usual. This situation originates from bureaucracy in government departments and has a considerable negative impact on contractors. Regular monthly payment to contractors for work done will help them to meet project objectives (Frimpong *et al*., 2003). Moreover, complex payment procedures of local authorities are the main reason for corruption in construction bidding—a significant threat influencing the success of contractors. The high growth rate of GDP together with an increase in growth rates of all economic sectors in the past five years (Mai, 2006) resulted in enormous demand for the construction industry. In addition, Vietnam is creating a favourable economic environment to boost the confidence of foreign investors in Vietnam's potential. As a result, an increase in the invested capital of all sectors is a significant opportunity for contractors.

The strategic performance analysis

Table 3 presents ACC's performance, its competitors' record and the performance scale of each perspective and KPI. The performance analysis indicated that ACC's financial performance is poor (59.16%) because the performance of 'percentage of management cost from revenue' (F-03) and 'Percentage of loan interest from profit' (F-04) are poor and very poor. Since F-04 has a large weight, very poor performance of F-04 brings about poor financial performance.

According to Table 3, the average performance of the customer perspective is moderate (75.70%). Three KPIs reaching good levels are C-03, C-04 and C-06. Though, only 'Quantitative rate of successful tenders at outside of AGP' (C-02) and 'Degree of customer satisfaction on the schedule' (C-05) obtain the moderate level whereas 'Value rate of successful tender at outside of AGP' (C-01) gains a poor level.

Table 3 indicates that the level of performance of KPIs such as I-02, I-05, I-09, I-10, I-11, I-12 is very good. However, moderate performance of KPIs such as I-04, I-06, I-07, I-08, and I-13, together with poor performance of 'Percentage of equipment investment from revenue' (I-01) and 'Degree of effect on receivable-account management' (I-03) consequently caused the moderate performance (71.39%) of the internal business process perspective.

The performance of the learning and growth perspective, as shown in the Table 3, only obtains the moderate level (62.68%) due to the moderate performance of most of KPIs except for good performance (80%) of 'Degree of in-house training of workers' (L-03).

In fact, the overall performance of ACC has only gained the moderate level (68.34%). The customer, internal business process and learning perspectives have moderate performance whereas financial perspective is at the poor level. This leads CEOs of ACC to see the bad aspects in the corporate strategic performance rather than information from traditional measures such as financial measurement. The appropriate solutions for performance improvements can come from above poor performance.

Cause-and-effect relationship among KPIs

Six cause-and-effect relationships among KPIs, which can be used as sources for strategic performance improvements, were uncovered. The following is a discussion of six identified relationships:

(1) Since the application degree of information technology (IT) to construction site management (L-06) has obtained 50%, there were problems such as: providing materials overestimates; overpayment for completed works; wasting time for summary, report preparation; reflecting no on-time performance

Table 2 The profile of KPIs: sources of data and formulation

Code	KPIs	Source of data	Formulation of KPI
Financial perspective			
F-01*	Percentage of profits from revenue	Accounting department Planning department	Profit after tax/Revenue
F-02*	The growth rate of annual revenue	Accounting department Planning department	(Revenue $year_n$ – Revenue $year_{n-1}$)/Revenue $year_n$
F-03*	Percentage of management costs from revenue	Accounting department Planning department	Total management costs/Revenue
F-04*	Percentage of loan interest from profits	Accounting department	Loan interest/Profit after tax
Customer perspective			
C-01	Value rate of successful tender at outside of AnGiang province (AGP)	Bidding department	Value of successful tenders in outside of AGP/Total value of successful tenders (only for 2005)
C-02	Quantitative rate of successful tenders at outside of AGP	Bidding department	Number of successful tenders in outside of AGP/Total value of successful tenders (only for 2005)
C-03*	Percentage of successful tenders from revenue	Bidding department	Value of successful tenders/Revenue
C-04	Degree of discounting bid prices	Board of directors	Personal interview
C-05	Degree of customer satisfaction on construction schedule	Owners, authorities and consultant firms	Average of respondents' score through five-scale questionnaire survey
C-06	Degree of quality on finished products	Owners, authorities and consultant firms	Average of respondents' score through five-scale questionnaire survey
Internal process perspective			
I-01*	Percentage of equipment investments from revenue	Accounting department	Equipment department/Annual revenue
I-02	Degree of effect on bid activities	Board of directors	Personal interview
I-03	Degree of effect on receivable-account management	Board of directors	Personal interview
I-04*	Percentage of marketing costs from revenue	Accounting department	Marketing costs/Annual revenue
I-05	Degree of on-time material provision	Board of directors	Personal interview
I-06	Degree of effect on construction costs at sites	Board of directors	Personal interview
I-07	Percentage of construction time variance	Engineering department Planning department	(Actual–Contractual) working time/The contractual working time
I-08	Time to prepare completed change orders	Board of directors	Personal interview
I-09	Degree of safety management performance at sites	Owners, authorities and consultant firms	Average of respondents' score through five-scale questionnaire survey
I-10	Acquiring quality management system (QMS) implementation at sites	Owners, authorities and consultant firms	Average of respondents' score through five-scale questionnaire survey
I-11	Degree of on-time repairing construction defects	Owners, authorities and consultant firms	Average of respondents' score through five-scale questionnaire survey
I-12	Degree of assigning tasks appropriately	Employees	Personal interview
I-13	Degree of updating professional knowledge	Employees	Personal interview
Learning and growth perspective			
L-01	Professional employee rate	Human resource department	Number of employees who had more than five years' experience/Total number of technical employees
L-02	Degree of the training of promising personnel	Board of directors	Personal interview and company record
L-03	Degree of in-house training of workers	Employees	Personal interview
L-04	Percentage of high-educational employees	Human resource department	Number of employees who had undergraduate degree/Total number of employees
L-05	Acquiring new technology for construction management (CM)	Board of directors	Personal interview and company record
L-06	Acquiring information technology (IT) for CM	Board of directors	Personal interview and company record
L-07	Percentage increasing of employees' salary	Accounting department	Company record

Note: * average value for 2003, 2004 and 2005.

Table 3 The results of the ACC's performance and its competitors

Code	KPI	Competitors' strategic performance		ACC's strategic performance	Score	Weight (W)	Result (R=W*PS)	Performance scale (PS=score/5)
		CC4	AREC					
Financial perspective						*15.5%*	*9.17%*	*59.6%*
F-01	Percentage of profit from revenue	1.5–1.7%	2.0–2.2%	1.7%	3.5	3.87%	2.71%	70%
F-02	The growth rate of annual revenue	12%	8%	9.1%	3.5	3.52%	2.46%	70%
F-03	Percentage of management cost from revenue	2.5–2.8%	2.73%	3.01%	3	3.76%	2.26%	60%
F-04	Percentage of loan interest from profit	0.7–1.0	0.7-0.9	1.34	2	4.35%	1.74%	40%
Customer perspective						*19.8%*	*15.2%*	*75.7%*
C-01	Value rate of successful tender at outside of AGP	14–17%	<3%	4.76%	2.5	3.40%	1.70%	50%
C-02	Quantitative rate of successful tenders at outside of AGP	20–25%	<10%	13.3%	3.5	2.03%	1.42%	70%
C-03	Percentage of successful tenders from revenue	55–60%	35–40%	48.6%	4.5	3.53%	3.18%	90%
C-04	Degree of discounting bid prices	Very good	Good	Very good	4.5	3.15%	2.83%	90%
C-05	Degree of customer satisfaction on the schedule	Good	Moderate	Good	3	3.64%	2.18%	60%
C-06	Degree of quality on finished products	Very good	Good	Very good	4.5	4.23%	3.81%	90%
Internal process perspective						*41.43%*	*29.58%*	*71.39%*
I-01	Percentage of equipment investment from revenue	0.2–0.25%	<0.1%	0.17%	2.5	2.97%	1.48%	50%
I-02	Degree of effect on bidding activities	Very good	Good	Very good	4.5	4.11%	3.70%	90%
I-03	Degree of effect on receivable-account management	Good	Good	Moderate	2	3.86%	1.54%	40%
I-04	Percentage of marketing costs from revenue	0.05–1.0%	<0.05%	0.05%	3	1.52%	0.91%	60%
I-05	Degree of on-time material provision	Good	Good	Very good	4	3.41%	2.73%	80%
I-06	Degree of effect on construction costs at sites	Good	Very good	Good	3	3.87%	2.32%	60%
I-07	Percentage of construction time variance	10–12%	12–15%	11.5%	3	2.95%	1.77%	60%
I-08	Time for to prepare completed change orders	15–20 days	10–15 days	15–20 days	3	3.31%	1.99%	60%
I-09	Degree of safety management performance at sites	Very good	Very good	Very good	5	2.81%	2.81%	100%
I-10	Acquiring QMS implementation at sites	Very good	Good	Very good	4.5	3.99%	3.59%	90%
I-11	Degree of on-time repairing construction defects	Very good	Good	Very good	5	1.94%	1.94%	100%
I-12	Degree of assigning tasks appropriately	Good	Very good	Good	4	3.87%	3.10%	80%
I-13	Degree of updating professional knowledge	Good	Moderate	Moderate	3	2.82%	1.69%	60%
Learning and growth perspective						*23.09%*	*14.47%*	*62.68%*
L-01	Professional employee rate	60–70%	<60%	53%	3	3.53%	2.12%	60%
L-02	Degree of the training of promising personnel	Good	Moderate	Moderate	3	3.75%	2.25%	60%
L-03	Degree of in-house training of workers	Good	Moderate	Good	4	3.76%	3.01%	80%
L-04	Percentage of high-educational employees	55–60%	40–45%	51%	3	3.76%	2.26%	60%
L-05	Acquiring new technology for construction management	Good	Moderate	Moderate	3	3.53%	2.12%	60%
L-06	Acquiring IT for construction management	Moderate	Poor	Poor	2.5	1.34%	0.67%	50%
L-07	Percentage increasing of employees' salary	>10%	10-12%	9.7%	3	3.41%	2.05%	60%
The overall strategic performance of the AnGiang Construction Company (ACC)=						100%	68.34%	

at construction sites. Those problems meant that 'Degree of effect on cost control at sites' (I-06) only gained the moderate performance level and then made an increase in management cost and interest.

(2) The performance analysis revealed a low rate of capable employees (L-01) who have more than five years of construction experience as well as undergraduate level (L-04), and poor training of middle managers (L-02). The aforementioned poor performance reflected incompetent human resource which brought about improper planning and scheduling, poor site management, improper materials procurement, slow decision making at sites, lack of cooperation between parties. These factors resulted in an increase of time overrun (I-07) and thus 'Degree of customer satisfaction on construction schedule' (C-05) is low. As a result, losing prestige and declining revenue growth are possible.

(3) The poor performance of human resource (L-01, L-02 and L-03) is also responsible for the moderate performance of 'Time to prepare completed change orders' (I-08). In addition, the wasted time preparing and correcting change of orders had an influence on the performance of 'Degree of effect on receivable-account management' (I-03) and on the increase of interest, so it resulted in the poor performance of 'Percentage of loan interest from profits' (F-04).

(4) Moreover, the poor performance of I-03 also came from reasons such as late checking for completed works leading to delay in payment, lack of commitment on accounts receivable, taking contracts under owner's financial difficulties. Eventually, loan interest has a considerable increase.

(5) 'Percentage of equipment investments from revenue' (I-01) gained a poor level of performance. A possible explanation is the use of defective equipment at sites. ACC bought almost no new equipment during the past three years. This resulted in construction time overrun, poor project quality, declining revenue growth and losing prestige.

(6) The moderate performance of 'Percentage of marketing costs from revenue' (I-04) brought about the poor performance of 'Value rate of successful tender at outside of AnGiang province AGP' (C-01) during the past three years. ACC shows excessive interest in traditional customers, and thus pays less attention to marketing and brand management. Seeking new customers is not much observed in the ACC strategy. On the other hand, gradual market penetration of its competitors is one of the main causes of ACC's low rate of revenue growth.

The above relationships imply that the performance of a KPI in a perspective can have an influence on performance of other KPIs in other perspectives and on the overall performance of the construction firm.

Appropriate solutions for improving strategic performance

In order to determine appropriate solutions for improving the overall performance of ACC, KPIs were labelled by their performance scales: less than 70% was labelled as weak; 70% to 79% as average; and over 80% as strong. The sources identifying which performance needs to improve can come from 17 identified KPIs with the weak label. According to the performance analysis and the 'cause and effect' relationships among KPIs, there are 26 preliminary solutions for strategic performance improvements classified into six groups, namely organizational structure and human resources; management model at sites; innovation of site management procedures; financial management; marketing operations; and equipment management. Since too many solutions could lead to ineffective execution of the work, crucial solutions had to come from refining preliminary solutions through interviewing two top managers. The effective evaluation matrix proposed by Lee and Ko (2000) was adopted to elicit which solutions would be the most effective. Rows of the matrix are KPIs with the weak label, and columns are preliminary solutions. Respondents were asked to give the score on effective levels for each solution over weak labels using the following scores: 'considerably effective' was scored as 9; 'more effective' as 6; 'effective' as 3; 'somewhat effective' as 1; and 'not effective' as 0. The effective level (EL) of each solution was computed using the following equation:

$$\text{Effective level}(\text{EL}) = \text{E}_\text{i}(\%) = \frac{\sum_{k=1}^{n} \text{M}_\text{ik}}{\sum_{i=1}^{N}\sum_{k=1}^{n} \text{M}_\text{ik}} \times 100 \quad (1)$$

where E_i=the effective level of the *i*th solution; I=the index of solutions; M_ik=the effective score of the *i*th solution to the *k*th weak label; k=the index of weak labels; n=total number of weak labels (n=17), N=total number of solutions (N=26).

The evaluation process resulted in 11 most effective solutions (Table 4) in which the group of solutions

Table 4 Most appropriate solutions to overcome weaknesses in strategic performance

No.	Refined solutions	Effective level (EL)
The organization structure and human resources		*23.8%*
1*	Providing the best working conditions for staff	5.6%
2*	Innovating the organizational structure so as to be more effective	5.4%
3*	Paying the appropriate salary to attract competent personnel	4.5%
4*	Offering appropriate training of young staff members at sites	4.4%
5*	Promoting promising staff members by the appropriate treatment	3.9%
Improving construction management process at sites		*33.0%*
6*	Strictly applying QMS at all levels of the company	8.5%
7*	Clearly stipulating obligations, benefits and duties of each member of staff	5.4%
8*	Frequent training of onsite staff in construction management procedures	5.4%
9*	Setting up a taskforce for checking the quality and the schedule in order to raise the management efficiency	5.1%
10	Establishing an alternative that can deliver materials on time	3.1%
11	Setting up a specialized team to check payments and completed works	3.1%
12	Setting up a special group to undertake quality control and warranty of works	2.4%
The management model at construction sites		*6.3%*
13	Diversifying the forms of subcontract	3.4%
14	Promoting a form of direct administration from the company for construction works	2.9%
Cost control		*9.4%*
15*	Applying information technology for construction cost control	4.0%
16	Issuing the rules of terms of advanced payments.	2.7%
17	Stepping up strict control of indirect costs	2.7%
Financial management		*5.2%*
18	Setting up a specialized team to recover all debts	2.9%
19	Timely payment to subcontractors for completed works	2.3%
Marketing activities		*8.9%*
20	Fostering the spread of the brand name at trade fairs	3.3%
21	Setting up company branches at other provinces	2.9%
22	Setting up a specialized group for marketing activities	2.7%
The exploitation and management of equipment		*13.4%*
23*	Giving financial support to small business units (SBU) to purchase new construction equipment	3.9%
24	Purchasing construction equipment that the company is deficient in	3.8%
25	Planning for effective maintenance of construction equipment	3.0%
26	Setting up a transport division to deliver materials on time	2.7%

Note: 1*, 2*, 3*, 4*, 5*, 6*, 7*, 8*, 9*, 15*, and 23* are the 11 most effective solutions.

relating to the innovation of site management procedures is significant (24.4%), followed by those relating to the organizational structure and human resources (23.8%). Accordingly, the CEOs approved 11 aforementioned solutions as a guideline for strategic performance improvements.

Conclusions

The fluctuation of the construction market including unforeseen difficulties and risks brought opportunities and threats to construction firms. Strategic management may be a critical way to cope with the circumstances. However, in developing countries construction firms seems to put fewer efforts into strategic management because of lack of effective tools and unawareness of strategic measures. The major objective of this paper is to describe how the BSC and SWOT matrix can be used to formulate business strategies and to measure the strategic performance of construction. AnGiang Construction Company (ACC) is selected as a case study for measuring strategic performance. A benchmarking approach was applied to compare ACC's performance with its competitors' best practices for improvement.

The results indicated that only the financial perspective came within the poor performance level, whereas the moderate level is typical for the customer, learning and growth, and internal process perspectives. In

addition, the findings imply that poor human resource management and ineffective site management are generally the 'Achilles' heel' of construction firms in Vietnam and very likely in other developing countries. The findings from the case study may benefit not only Vietnamese construction firms but also firms in other developing countries in order to identify their strategies, quantify strategic performance, and improve their competitive advantage.

The findings also indicated that better management of receivable accounts, careful evaluation of the financial capacity of owners, and effective training of the in-house personnel are meaningful factors for measuring strategic performance. To deal with severe competition in the construction market of developing countries, these factors may be overlooked when construction firms formulate their strategies using pure SWOT analysis. Therefore, the BSC-oriented SWOT analysis can provide a basic framework to identify the meaningful SWOT factors for strategic performance measurement. In addition, poor performance of the studied company in managing receivable accounts and acquiring information technology for construction management reflected that several inappropriate strategies developed before the application of BSC-oriented SWOT analysis may cause potential threats to its sustainable development. The integration of the BSC approach and SWOT analysis can help construction firms in developing countries to identify short-term objectives and long-term strategies, establish the performance measurement system, quantify strategic performance, and improve their competitive advantage.

A SWOT analysis and BSC framework are popular with all companies in developed countries whereas both methods are rarely used in developing countries. A possible explanation is that CEOs of construction companies in developing countries recognize no benefits from SWOT analysis and BSC. As competition in the construction market increases, top managers of those companies often face somewhat urgent problems related to the company's existence rather than strategic management. In this context, the findings from this case study provide valuable lessons for practitioners in the application of new management frameworks (i.e. BSC and SWOT) in managing their strategic performance in other developing countries and regions.

Although extensive efforts have been made, the limitations of the study are unavoidable. The sample size should be larger when measuring the performance of customer satisfaction. Two competitors identified by directors of the company may mean that other potential competitors were overlooked. Thus, other approaches should be integrated to determine all competitors. Future studies should apply the proposed conceptual framework to other construction firms so that the combined SWOT analysis and BSC approach can prove its usefulness in strategic performance improvements. Moreover, the following recommendations may be useful with other companies to apply the BSC concept. First, strong top management commitment is required for the verification of the vision and strategies. Secondly, strong commitment from the management team is also required so that data collection methods can be carefully reviewed and revised. Finally, reasonable time is required to collect appropriate raw data.

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Appendix 1

A profile of the Vietnamese construction market (VCM) and Vietnamese construction industry (VCI) (www.vietnam.gov.vn)

1. The firm distribution by size and the output of firms by size category (2003)

Item	Total	Firm size		
		Small	Medium	Large
		2	3	4
The firm distribution by size (firms)	9717	7224	1924	569
%	100	74	20	6
Output of firms by size category (i.e. net revenue) (billion VND)	13494	14573	52736	46185
%	100	11	46	43
Number of employees (31 December) by firm size (persons)	861791	121978	349030	390783
%	100	14	41	45
Contribution to state budget (billions VND)	3166	377	1551	1238
%	100	12	49	38

2. Some key indicators of the construction output at the national level

	Unit	2001	2002	2003
The contribution of VCI to gross domestic product (GDP)	%	5.80	5.89	6.05
The proportion of profit to turnover	%	5.046	5.134	5.368
The proportion of capital expenditure to total state expenditure	%	27.85	24.49	30.04
Number of employees (31 December)	Persons	627591	799001	861791
Average income of one employee	$/month	58.17	94.10	77.27
Average corporate revenue per employee	$	5915.70	6655.16	8134.09