

SME CONSTRUCTION INDUSTRY SUBCONTRACTORS PERFORMANCE MEASUREMENT AND IMPROVEMENT

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ABSTRACT

This paper focuses on performance measurement and improvement within SME construction industry subcontractors. It commences with a literature review of tools and techniques such as quality assurance and certification, total quality management, quality awards and business excellence frameworks and benchmarking traditionally used to measure performance and improvement in a wide range of enterprises. Many of these approaches have reached maturity in manufacturing companies and many have been adopted in service companies. However, the construction industry has largely been untouched by these developments. The paper explores the potential of an International Business Profile Benchmarking instrument within the construction industry by applying it to a firm in the construction supply chain. This world-class approach has been widely used in Europe and has enabled significant sectoral supply chain developments.

Key Words: Construction Industry, SME, International Business Profile Benchmarking

INTRODUCTION

In the developed and developing worlds, SME sector firms routinely make up over 95% of companies. Such firms dominate the construction industry supply chain. The supply chain in the construction industry is less well developed than in manufacturing. Supply chain development and capacity building have been largely neglected in the construction sector, despite rhetoric about the importance of the SME sector to the economy. The project-oriented processes of construction and the fragmented nature of the subcontract industry have, doubtless contributed to the developments in the sector. However, since capital projects that provide the infrastructure of developed and developing nations consume many billions of dollars worldwide, the improvements in quality, delivery, reliability and costs achieved in the manufacturing sector have the capability to contribute a great deal to communities in the form of improved infrastructure at significantly reduced costs.

LITERATURE REVIEW

Love, Li, Irani & Faniran (2000) write:

If the Australian construction industry is to address the recommendations of the Construction Industry Development Agency (CIDA, 1995), and New South Wales Royal Commission

(NSW, 1992) and improve its performance and competitiveness, then there needs to be a cultural and behavioural shift in the mind-set of practitioners, academics and the professional institutions.

The construction industry is dynamic in nature due to the increasing uncertainties in technology, budgets and development processes (Chan & Chan, 2004a). Sanvido, Grobler, Pariff, Guvents & Coyle (1992) in Chan & Chan (2004a) identified that a building project is completed as a result of a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment.

Li, Cheng, Love & Irani (2001) indicate that the market and organisational structure of the construction industry is highly fragmented and divisive. Construction projects are organised by different parties linked hierarchically together by contracts. These parties include clients / owners, architects, engineers, general contractors, sub-contractors, suppliers etc. They possess various skills and knowledge although they belong to the same industry. Because of the diversity of these parties, they tend to have their own goals and objectives, which can be conflicting and may induce adversarial relations.

Whilst many characteristics can affect the effectiveness of project teams and project completion, the concept of project success means many different things to many different people. The debate over measuring construction project success and improvement has been just as wide-ranging. Quality assurance and certification, total quality management (TQM), quality awards and business excellence frameworks, business performance measurement and key performance indicators, balanced scorecard and benchmarking are some the more common methods available for use within the construction industry. This literature review will look at international construction industry engagement with these improvement tools.

Criteria of Project Success

The extent of progress that a construction enterprise can make towards achieving its goals must be measured on a periodic basis using facts and data. Construction time has been acknowledged by construction researchers and industry practitioners over the past three decades as one of the most important performance criteria of many successful projects (Chan & Chan, 2004b). Performance

measurement systems were historically developed as a means of monitoring and maintaining organisational control, which is the process of ensuring that an organisation pursues strategies that lead to the achievement of overall goals and objectives (Nanni, Dixon & Vollmann, 1990, cited in Amaratunga, Baldry & Sarshar, 2001). Performance needs to be measured in relation to the objectives or goals identified in the business planning processes.

Quality Assurance and Certification

How do you transform the construction industry from a fragmented and poorly organised industry to a fully streamlined and globalised industry that can competitively meet the needs of construction customers globally? Jaafari (2000) suggested that the answer that many governments and owners of businesses around the world had in 1988-1995 was simple, force businesses to operate under the then newly released ISO 9000 series quality assurance (QA) standards. The adoption of QA standards worldwide was a manifestation of the belief that managing the delivery process would ensure a quality outcome. Nwanko (2000) indicated that quality management strategies in small firms largely revolved around quality accreditation schemes, that is, ISO 9000-type systems. Rao, Raghunanathan, Skrabec, Aurora & Agrawal (1998) reported that the key benefits of implementing ISO 9000 were improvements in quality awareness, documentation, standard operating procedures and accounting practices as well as the ability to sustain and increase market share.

Various researchers have reported additional organisational benefits for those aspiring to and achieving certification to ISO 9000. Kean, Schofield and Oxley (1995) report that 80% of respondents to their survey indicated that quality assurance certification had generally benefited their business and that 58% believed that quality assurance had led to increased profitability. Ramsay (1998) writes that other benefits have been reported by Brown and van der Wiele (1995), Kean et al. (1995) and Pyra & Preston (1996) as profitability, less waste, maintaining or increasing market share, marketing tool, improved processes and customer focus, better human resource practices, supplier relations and product quality. Jones, Arndt & Kustin (1997) also suggested that organizations that

have had quality systems in place for some time perceive greater benefits than those considering implementation or who have only recently achieved certification.

Love and Li (2000) reported that:

Serendipitous findings are reported from an on-going research project that seeks to determine the effectiveness of quality assurance systems certified under the ISO 9000 series in Australian contracting organisations. In Australia, certification has become mandatory for all organisations wishing to do business with government agencies and major private companies. While certification was designed so that purchasers could have confidence in the quality of the vendor's product or service, not all organisations have been able to implement certification processes in a way that supports the original intent. Instead, most construction organisations have opted to go through the motions without an underlying sustainable continuous improvement philosophy. They simply wish to gain marketing benefits, while others have been overcome by the mass of paperwork required for achieving the quality 'seal of approval'.

A number of other challenges or barriers to implementation of quality systems and certification were reported. These have included employee resistance, lack of information, additional (quality) documentation, limited resources (Rao et al., 1998) and costs (Ramsay, 1998).

Kumaraswamy & Dissanayaka (2000) reports that within the Hong Kong construction industry client driven pushes for ISO 9000 certification have overtaken any spontaneous 'pull factors' (motivators) towards quality improvements 'for their own sake'. The need for ISO 9000 certification as a prerequisite for even being considered for public sector construction works appears to have distracted some organisations from a more comprehensive organisation-specific development of their quality management system.

Implementing quality assurance is perhaps only the first hurdle of quality management that an organisation must address if it is to adopt the learning disciplines. Terziovski, Samson & Dow (1997) found that merely implementing QA does not improve organisational performance. Only when a continuous improvement philosophy is used in conjunction with an effective QA system will organisational performance improve (Oakland & Sohal, 1996, p. 18).

Total Quality Management

Total quality management (TQM) provides the overall concept that fosters continuous improvement in an organisation. TQM is an approach to improving the competitiveness, effectiveness and flexibility of a whole organisation. It is essentially a way of planning, organising and understanding each activity, and depends on each individual at each level (Oakland & Sohal, 1996, p. 18). Love et al. (2000) write that TQM has not been well received by the construction industry because it is perceived to be synonymous with QA. Consequently, construction organisations have not progressed to implement continuous improvement initiatives, and therefore the potential for learning has been inhibited.

Sommerville & Roberston (2000) suggest that within the construction industry there exists a set of resistance forces which may be perceived as specific to the industry's adoption of holistic TQM. This dysfunctional set may be considered as containing five broad sub-headings (Sommerville, 1994):

1. Product diversity – each construction is unique.
2. Organisational stability – consistently high number of organisational collapses in the construction industry.
3. Holonic networks and change – the projects are often very large, seldom situated in the same location and still predominantly labour intensive.
4. Contractual relationships – majority of projects executed will be carried out under some form of contract, of which there is a plethora.
5. Teamwork and management behaviour – teamwork (or the absence of it) and management behaviour may be the more cogent factor in establishing the success of TQM within the industry.

Quality Awards and Business Excellence Frameworks

In an era where global competition is highly intense, different countries apply quality methodologies in the form of strategic quality management, quality systems, quality assurance and quality control in order to gain or sustain a competitive edge (Puay, Tan, Xie & Goh, 1998). Tan (2002) goes further and writes:

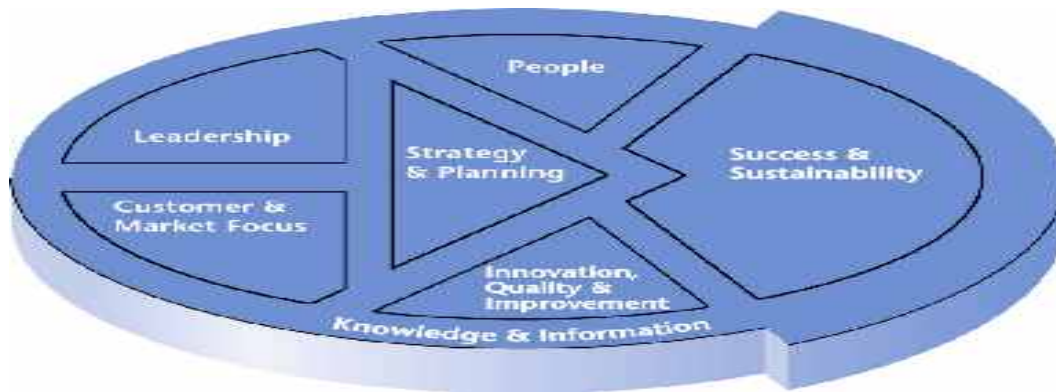
Quality is no longer confined to the quality of a product or a service. It applies to delivery, administration, customer service and all other aspects of company activities. Quality encompasses all the ways in which a company meets the needs and expectations of its financial stakeholders, its customers, and the community in which it operates.....National

quality awards (NQAs) are a means by which countries at a national level promote quality awareness.

Three awards have played a key role in the development of NQAs. They are the Deming Prize (Japan), the Malcolm Baldrige National Quality Award (USA) and the European Quality Award. Many countries have modelled their award programs on these awards. Tan (2002) indicates that NQAs typically contain seven to ten examination criteria and a further 20 to 30 sub-criteria. The Australian Business Excellence Framework (ABEF) was developed in 1987 and was one of the first four global excellence frameworks. It was initially developed in response to Commonwealth Government and general industry calls for Australian enterprises to be more efficient and competitive. The Framework is reviewed and updated annually by a Committee formed of management and leadership experts to reflect the latest in management thinking and practice. The Framework was developed with the objective of describing the principles and practices that create high performing organisations. The criteria could then be used by organisations to assess their performance and drive continuous and sustainable improvement in their leadership and management systems. The Framework is also used as the assessment criteria for the Australian Business Excellence Awards. Through the Awards, organisations can be recognised for their achievements in excellence and improvement.

ABEF is Australia's Framework for innovation, improvement and long term success, applicable to all organisations, large and small, private and public, whatever their purpose. The Framework has been designed to assist organisations to measure current performance and build a pathway to long-term success (Business Excellence Australia, 2004). The ABEF describes the principles and practices of high performing organisations and contains collective intellectual capital and business wisdom gathered over 15 years. The current edition has been streamlined to refocus organisations on the importance of the set of 12 principles of leadership and management. A body of published research that underpins all similar frameworks throughout the world supports these Principles, which have evolved over the past 50 years. The Framework also identifies 7 interrelated Categories that emphasise the holistic nature of the model.

Figure 1: The Australian Business Excellence Framework



Source: Business Excellence Australia, 2004

Leading Australian and Australian based organisations use the Framework to improve management and leadership practices, assess the performance of their leadership and management systems, build those results into strategic planning processes and benchmark where their organisation stands in terms of the marketplace and competitors. The Framework has been built on time-honoured and tested principles of leadership and management, known as the Principles of Business Excellence. They form the basis of a unified theory of management. The 12 Principles of Business Excellence, when understood and applied across the organisation, provide a powerful and integrated philosophy of leadership and include:

1. Clear direction
2. Agreed plans
3. Customer focus
4. Improve process
5. Involve people
6. Continual learning
7. Systems thinking
8. Use data effectively
9. Understand variation
10. Community impact
11. Stakeholders value
12. Role-model leadership

(Business Excellence Australia, 2004).

The Framework is an integrated leadership and management system that describes the essential features, characteristics and approaches of organisational systems that promote sustainable, excellent

performance. Application of the Principles, through the Categories and Items of the Framework can guide organisational improvement and success.

The ABEF complements other management systems such as ISO 9001:2000, Investors in People, Balanced Scorecards, Business Process Re-Engineering and Organisational Performance Measurement, providing an umbrella under which any or all of these programs can be brought together to form one coherent, cohesive whole.

Balanced Scorecard

The balanced scorecard (BSC) is a widely used management framework for the measurement of organisational performance. The BSC concept suggests that the state of processes of an organisation can be best assessed by taking a 'balanced' view across a range of performance measures (Amaratunga, Baldry & Sarshar, 2001). Barsky & Bremser (1999) indicate that the BSC was introduced as a model for implementing strategy by Kaplan and Norton. It is designed to be a strategic management system that enables organisations to translate strategic goals into relevant measures of performance. Financial and non-financial measures are indicators of the extent that strategies are successfully being implemented throughout the organization, and whether strategic goals are being achieved. The Kaplan and Norton model of the BSC viewed the organisation in four perspectives that were designed to link short-term operational control to the long-term vision and strategy of the business (Amaratunga et al., 1995). These perspectives were:

1. Financial – How do we look to our shareholders?
2. Internal business processes – What must we excel at?
3. Learning and growth – How can we continue to improve?
4. Customer – How do our customers see us?

Ernst & Young (1997) identified the ten most important non-financial measures or metrics as:

1. Strategy Execution.
2. Management Credibility.
3. Quality of Strategy.
4. Innovativeness.
5. Ability to Attract Talented People.
6. Market Share.
7. Management Experience.
8. Quality of Executive Compensation.
9. Quality of Major Processes.
10. Research Leadership.

Barsky & Bremser (1999) suggest that these metrics can be easily tied into routine planning and budgeting in a balanced scorecard environment. Under such conditions, the budget is considered to be much broader in scope, reaching well beyond financial performance.

Benchmarking

Benchmarking of best practices has proved useful in the business and manufacturing sectors. However, benchmarking is not well established in the construction industry in general. Mohamed (1996) suggests that benchmarking is not a straightforward task due the very nature of the construction business that lacks solid data gathering and remarkable fluctuations in productivity. Benchmarking only works if consistent methods of measuring the performance of operations can be develop and introduced. However the UK construction industry has identified benchmarking as one of a number of initiatives to assist in the drive for major improvements in efficiency and economy (Garnett & Pickrell, 2000).

Jaafari (2000) states:

Knowledge of current management tools and techniques will no doubt prove useful in the quest for transforming business. However, no long lasting effect can be expected unless attention is paid to the fundamental principles and practices that govern organisational behaviour, including the views an organisation has of its customers, competitors, and itself.

Winch & Carr (2001) reinforce that construction is an increasingly global industry, and benchmarking initiatives that are restricted to a single country run the risk of complacency, as national best practice falls out of line with international best practice. Amaratunga et al. (2001) engenders the thought that the importance of performance management in an organisation has been emphasised by many authors. Oakland (1983) cited in Sinclair & Zairi (1995) suggests that measurement plays an important role in quality and productivity improvement to:

- Ensure customer requirements have been met;
- Provide standards for establishing comparisons;
- Provide visibility and provide a ‘scoreboard’ for people to monitor their own performance levels;
- Highlight quality problems and determine which areas require priority attention;
- Give an indication of the costs of poor quality;
- Justify the use of resources; and
- Provide feedback for driving the improvement effort.

The challenge has been to identify where to start and what measures to use. The International Business profile Benchmarking instrument described in the next section may provide that 'missing link'.

INTERNATIONAL BUSINESS PROFILE BENCHMARKING

The International Business Profile Benchmarking instrument, which was initiated in the United Kingdom as the UK Benchmarking Index and has been developed into a diagnostic instrument for European small and medium sized firms, has been successfully piloted in Australia. Dalrymple (2000) writes that the owner managers of the Australian companies, which participated in the research program, confirmed the validity of the instrument for their particular business.

The input data requirements for the generation of the company's profile consists of several elements derived from, for example, *Management Today's* Best Factory Awards. These are Financial Revenue and Costs, and Financial Capital which form the financial data set and a Management Data set. Each of these areas has a number of elements for which data is required. Each element is accompanied in the data capture instrument by an explanatory definition. For manufacturing firms, there is an additional module which addresses competitiveness issues in manufacturing operations, including component and assembly set-up times. Only the main instrument will be dealt with in this paper.

Input Data Requirements

Financial Revenue and Costs Data; Financial Capital Data; Customer Satisfaction Data; Innovation Data; Suppliers Data; People Management Data; People Satisfaction: Business Excellence Data

The business excellence elements are: *Leadership, Policy and Strategy, People Management, Resource Management, Business Processes, Customer Satisfaction, People Satisfaction, Impact on Society, Business Results*. The data relating to these elements are qualitative data based on management's perception. The data requirements are, therefore, not excessively onerous for the small and medium companies. The data can then be used to produce comparisons with international companies that have a similar turnover and number of employees operating in a common industry sector.

The Report

The output of the comparisons is contained in a report which provides a graphical comparison and a table showing best in class, lower and upper quartiles and the average for the following measures:

Profitability Measures: Pre Tax Profit / Turnover, Return on Capital Employed, Return on Net Assets, Return on Total Assets, Value Added , Value Added / Net Assets , Turnover / Orders

Financial Management Measures: Short Term Assets/Current Liabilities , Gross Gearing , Net Gearing , Short Term Debt/Long Term Debt , Pre Tax Profit / Interest, Credit Payment Days, Debtor Days, Stock Turnover, Cash in Bank / Turnover , Turnover /Working Capital

Productivity Measures: Turnover/Overheads, Turnover per Employee, Value Added per Employee, Pre Tax Profit per Employee

Investment Measures: Capital Investment/Turnover, Capital Investment/Depreciation, Marketing Expenditure/Turnover, R&D Expenditure/Turnover, Training Expenditure/ Turnover, R&D Expenditure/Pre Tax Profit, Capital Investment/Pre Tax Profit

Growth Measures: In all cases, two years of data are collected for the financial data. This enables an indicator to be provided for comparisons with growth year on year for the following measures: Turnover, Pre Tax Profit / Turnover, Return on Net Assets, Return on Capital Employed, Capital Investment / Turnover.

Customer Service Measures: Complaints/Orders, Complaints/Customers, Order Value of Complaints/Turnover, Orders Not Delivered When Promised/Orders, Orders Rejected During Warranty/Orders, Orders Failed Prior to Delivery/Orders

Innovation Measures: Income From New Geographies/Turnover, Income From New Market Segments/Turnover Income From New Products / Turnover, New Customers / Total Customers, Total New Income / Turnover.

Supplier Management Measures: Sub Standard Supplies/Bought In Materials, Supplies Delivered On Time/Bought In Materials, Turnover/No of Suppliers, Bought In Materials/No of Suppliers.

People Management Measures: Direct/Indirect, Employee/Manager, Graduate/Employee, Number of Management Levels, Total Training Days / Employee, Training Expenditure / Employee.

People Satisfaction Measures: Total Days Lost to Absenteeism/Employees, Accidents/Employees, Early leavers/ Employees, New Employees / Employees, Total Leavers / Employees.

Reporting Back

The report must then be interpreted in the context of the company and its markets, environment and operations. Appropriate and skilled interpretation highlights strengths and weaknesses of the company and this enables the selection of improvement opportunities on a rational basis. The tracing of indicators at the macroscopic business level down to operational level enables potential causes of reduced competitiveness in operations to be identified. Action plans are then drawn up to seek to remedy these causes and improve the overall competitiveness of the enterprise.

THE CASE STUDY

The case study reported here is a small engineering company that manufactures stainless steel products off site and then installs the off site manufactured prefabricated units. The company recognised that there may be some advantage to be gained from participating in the main business profile benchmarking process. As an offsite manufacturer, the company also participated in benchmarking for their manufacturing operations. The company has around 30 employees and turns over around AU\$3million. As a business, this company was compared with over one hundred and fifty other businesses with a similar number of employees and similar turnover in the same industry. The firms were from an international grouping including European and Australian companies. The case study company was average on a number of profitability measures, but in the top quartile for having good-sized orders and for adding value on the premises. This reflects the fact that the company buys in basic raw materials and engages in elaborate transformation of these. The company also makes very good use of its working capital. The company performs well on financial management, but less well in all measures of productivity. However, the company has an outstanding performance on customer service and customer satisfaction. The people satisfaction measures are all around the median. The overall concern for the company as a business lies in the fact that it is not strongly profitable and its commitment to customer focus results in the use of significant overtime

penalties and there is low profit per employee and turnover per employee. The manufacturing module indicates that the company has relative weakness in the area of scrap and rework compared to about 25 companies. This contributes to the need for overtime and lower profitability than what is feasible and being achieved by the peer group of companies. Thus, as a manufacturing business, the firm is making a profit, but improvements in the levels of scrap and rework would significantly improve the company's overall performance. The company was, therefore assisted to investigate its operations to identify opportunities for waste reduction.

The Benchmark Index has a Building Engineering Services Contractor's Module Questionnaire that facilitates additional information that is relative to the construction sector. This is in two parts and includes the interaction between the company and its customers and how the project process is carried out by the business. In this case, the case study company was compared with around 60 similar companies and it was clear that the firm had a strong market focus reflected in the fact that it performed well in the percentage of contracts won. It also performed very well on delivery on time, but that was at the cost of exceeding the planned labour costs and failure to achieve anticipated profit. The SME subcontractor is able to be benchmarked to identify the strengths and weaknesses and in that way, any investment in improvement activity will be targeted on genuine weaknesses as opposed to perceived weaknesses that are not substantiated by data. The important factor in this work is the profile, rather than any individual measure. Some measures provide direct evidence of a particular weakness, and this can be triangulated and confirmed by examination of other measures that are consequences of the actual weaknesses. A similar approach must be taken to the analysis of strengths to ensure that an apparent strength is, in fact, real. If it is, then there will be other confirmatory evidence in the profile.

CONCLUSION

The uniqueness and diversity of the construction industry demands a process improvement tool that can establish an organisation's current status across a number of accepted quantitative and qualitative measures. Construction organisations have attempted to use a number of frameworks including ISO

9000 and TQM, National Quality Award (Business Excellence) models, balanced scorecard and benchmarking to assist them to become more competitive and sustainable.

As an instrument, the International Benchmarking Index provided an opportunity for growing SME within the construction industry to understand their strengths and weaknesses across a number of dimensions in order that growth can be firmly based on recognised strengths. It is also essential that barriers to growth which are likely to impede the growing firm are identified. Action can then be taken to address areas of weakness and prepare the firm for successful growth.

Thus, the International Business Profile Benchmarking instrument was successfully used in an SME sector construction industry sub-contractor and has demonstrated potential to provide the 'missing link' in construction industry supply chain performance improvement.

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