



COOPERATIVE RESEARCH
CENTRE
for
CONSTRUCTION INNOVATION

**Construction
Supply Chain
Development
Interim Report**

Program	C
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Introduction

The supply chain in the construction industry is less well developed than in manufacturing. This project proposes to bring world class international business profile benchmarking to assist in the development of small and medium sized (SME) subcontractors. This approach has been widely used in Europe and has enabled significant sectoral supply chain development.

The construction SME supply chain is a critical component in the delivery of all construction projects. Furthermore, it undermines the sustainability of the individual enterprise and puts construction projects and jobs at risk. Government procurement agencies view this as construction industry capacity building.

In the developed and developing worlds, SME sector firms routinely make up over 95% of companies. The construction industry supply chain is dominated by such firms. 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

This project seeks to investigate the potential to apply the International Business Profile Benchmarking instrument with the construction industry. The project recognises that there are many facets to the quest for continuous improvement in the construction industry and in wider workplace in general.

This first interim report reviews the international literature relating to construction industry performance measurement and performance improvement. A summary of the findings follow. 'Best value' is dealt with in a separate interim report.

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, 2004). Sanvido, Grobler, Pariff, Guvents & Coyle (1992) in Chan & Chan (2004) 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. Measuring 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 used 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 periodical 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, 2004).

Performance measurement systems 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 for implementing ISO 9000 were:

- Improvement in quality awareness;
- Improvement in documentation;
- Improvement in standard operating procedures;
- Improvement in accounting practices;
- Ability to sustain market share; and
- Ability to 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;
- Improved customer focus;
- Better human resource practices;
- Better supplier relations; and
- Better 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 that 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) writes 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 time-honoured principles of leadership and management. The Framework also identifies 7 interrelated Categories that emphasise the holistic nature of the model. Success can only be maximised if organisations have in place sound systems and processes for all seven.



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. These Principles, which have evolved over the past 50 years, are supported by a body of published research that underpins all similar frameworks throughout the world. 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. Organisations that live by these principles can create best practices across the whole management system.

The 12 Principles of Business Excellence

1. Clear Direction	Clear direction allows organisational alignment and a focus on the achievement of goals
2. Agreed Plans	Mutually agreed plans translate organisational direction into actions
3. Customer Focus	Understanding what clients value, now and in the future, influences organisational direction, strategy and action
4. Improve Processes	To improve the outcome, improve the system and its associated processes
5. Involve People	The potential of an organisation is realised through its people's enthusiasm, resourfulness and participation
6. Continual Learning	Continual improvement and innovation depend on continual learning
7. Systems Thinking	All people work in a system; outcomes are improved when people work on the system
8. Use Data Effectively	Effective use of facts, data and knowledge leads to improved decisions
9. Understand Variation	All systems and processes exhibit variability, which impacts on predictability and performance
10. Community Impact	Organisations provide value to the community through their actions to ensure a clean, safe, fair and prosperous society
11. Stakeholders Value	Sustainability is determined by an organisation's ability to create and deliver value for all stakeholders
12. Role-model Leadership	Senior leadership's constant role-modelling of these principles and their creation of a supportive environment to live these principles, are necessary for the organisation to reach its true potential

Source: 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 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, reach well beyond financial performance.

When it comes to implementing the BSC, Roest (1997) suggested the following rules:

1. There are no standard solutions; all businesses differ.
2. Top management support is essential.
3. Strategy is the starting point.
4. Limited and balanced number of objectives and measures.
5. No in-depth analyses up front, but refine and learn by doing.
6. Take a bottom-up and top-down approach.
7. It is not a systems issue, but systems are an issue.
8. Consider delivery systems at the start.
9. Consider the effect of performance indicators on behaviours.
10. Not all measures can be quantified.

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 which lacks solid data gathering and remarkable fluctuation 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.

Li et al., (2001) suggest that co-operative benchmarking should be used as a tool for achieving partnering excellence in construction projects. They developed an eight-stage process (COBAP) which can be used to improve the performance of parties entering into partnering agreements. This process can be described as:

1. Developing the COBAP team.
2. Planning what to be improved.
3. Comparing the current performance gap.
4. Gaining commitment to the needs of change.
5. Developing action plans.
6. Implementing actions and monitoring progress.
7. Feedback to the implemented change.
8. Achieving superior performance.

If superior performance is achieved then the process starts again with a new team and performance gap. If the problem is not resolved then a new action plan is developed and the process continues. This process facilitates collective learning which can sustain a competitive edge.

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 instrument itself requires the assembly of a data set comprising of financial data, similar to that incorporated in a company's taxation return, management data, most of which should be routinely collected by a company's management. The final element of the data set is subjective data obtained from the managers which reflects the type of data which might be assembled in connection with the quality award organisation's business excellence models.

The output report consists of a number of standard accounting measures of a company's wellbeing, a number of measures in the management area which were based on the *Management Today* 'Best Factory Award'. The 'business excellence' data is based on the European Foundation for Quality Management's Business Excellence Model. Thus, the components of the report are all drawn from well established sources of measures of business wellbeing.

The SME sector companies which are seeking to grow require to understand their strengths and weaknesses 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.

The data collection instrument is a questionnaire designed to help an organisation assess its competitive position. It is based on a tried and tested framework of assessing organisations in a comprehensive manner. The questionnaire focus on a number of performance measures, which range from financial and operational areas through to the following commonly accepted factors of measuring organisational excellence:

- Leadership.
- Policy and Strategy.
- People management.
- Resource Management.
- Business Processes.
- Customer Satisfaction.
- People Satisfaction.
- Impact on Society.
- Business Results.

The data collection process involves both quantitative and qualitative measures of performance, giving a comprehensive initial analysis of an organisation's situation. Initial benefits include:

- Helping the organisation identify its current position and determining the best future direction and priorities.
- Allowing comparisons with the achievements of other organisations.
- Encouraging the organisation to monitor its progress on a regular basis.

The Benchmark Index has a Building Engineering Services Contractor's Module Questionnaire that facilitates additional information that is relative to the construction sector. This two parts includes the interaction between the company and its customers and how the project process is carried out by the business.

Conclusion

The uniqueness and diversity of the construction industry behoves 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 provides 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.

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