THE DEVELOPMENT OF A COMPREHENSIVE FRAMEWORK FOR MEASURING BUSINESS PERFORMANCE IN CONSTRUCTION

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Business performance measurement has been the subject of considerable research over the past fifteen years. Most of this research has been triggered by the inadequacy of financial indicators and the increasing use of non-financial indicators. Consequently, companies have to choose from many available frameworks / methods to monitor their business performance such as the Balanced Scorecard, Excellence Models and industry key performance indicators (KPI). The choice of one framework / method over the others might omit important performance information, and the use of more than one simultaneously can cause confusion and the use of valuable time and resources. This paper describes the PhD research underway to develop a comprehensive business performance measurement framework for construction organizations. The research adopts a hypothetico-deductive approach that comprises two main stages. First, the framework is formulated from existing well-established frameworks in literature. The second stage is the empirical testing of the framework that uses triangulated methods for collecting and analysing data. The paper further discusses the scope of the research within the industry, and finally the use of the framework in measuring business performance and its interface with the construction KPI.

KEYWORDS: Balanced scorecard, Business performance measurement, Comprehensive framework, Construction, Excellence models.

INTRODUCTION

Business performance measurement has witnessed a considerable amount of research over the past fifteen years, to the extent that it has been considered a revolution (Neely 1999). Most of this research has been triggered by the inadequacy of financial indicators and the increasing use of non-financial indicators. A plethora of business performance measurement frameworks are available for companies to choose from such as the Balanced Scorecard (Kaplan and Norton 1992, 1993 and 1996) and Excellence Models (BNQP 2002 and British Quality Foundation 2002). They all simultaneously exist, however, provide separate perspectives of business performance, overlapping in certain areas and differing in others (Bassioni, Price and Hassan 2003; and Neely and Adams 2001). Moreover, specific key performance indicators (KPI) of the industry (Construction Best Practice 2003) have been developed for benchmarking purposes but have been argued as not providing a holistic view of a company's internal performance (Kagioglou et al. 2001). As a result, the choice of any one framework / method over the others might omit important performance information, and the use of more than one framework simultaneously can cause confusion and excessive use of valuable time and resources.

This paper describes the PhD research underway to develop a comprehensive business performance measurement framework for construction organisations. The following sections describe the approach adopted, the research process including the research methods used, the research scope; the use of the framework in measuring performance; and finally a conclusion.

HYPOTHETICO-DEDUCTIVE APPROACH

The development of a conceptual framework in doctoral dissertations can adopt a hypothetico-deductive approach (Royer and Zarlowski 2001). Under this approach hypotheses can be formulated from existing principles and theories in literature and, subsequently, verified through experiencing and testing (Vittikh 1996). In engineering and management research, the hypothesis can be in the form of a conceptual framework that is verified through empirical testing (Royer and Zarlowski 2001).

In light of the hypothetico-deductive approach, this research has been divided into two stages, as shown in Figure 1. The first stage is the formulation of the framework that is based on a rigorous literature review. The second stage will be the empirical testing of the framework that is achieved through triangulated data collection and analysis methods, where both qualitative and quantitative techniques are used to modify, confirm and validate the framework (Fellows and Liu 2003). This can be seen in the research process discussed in the next section and illustrated in Figure 2.

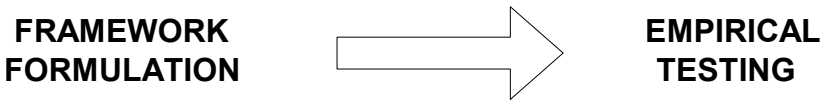

Figure 1: A hypothetico-deductive approach for framework development

THE RESEARCH PROCESS

Based on the discussion in the previous section and in light of the adopted hypothetico-deductive approach, a full research process was developed. This is detailed in Figure 2 and explained within this section.

Literature Review

The topics reviewed in literature for this research were: business performance measurement and contemporary frameworks; advancements of quality management and business excellence models; and strategic performance measurement. All of these topics were reviewed in general and for construction in particular. Databases of journals, texts and conference papers were used, in addition to Internet searches. The search resulted in a bibliography of over 350 citations. The literature was critically reviewed in a manner relevant to this research.

The literature review had two main roles. First, it led to a summary of contemporary issues and an analysis of gaps in knowledge of the field, which reinforced the relevance of the research topic (Bassioni, Price and Hassan 2003). Second, it acted as a basis for the formulation of the proposed framework that is discussed in the following sub-section.

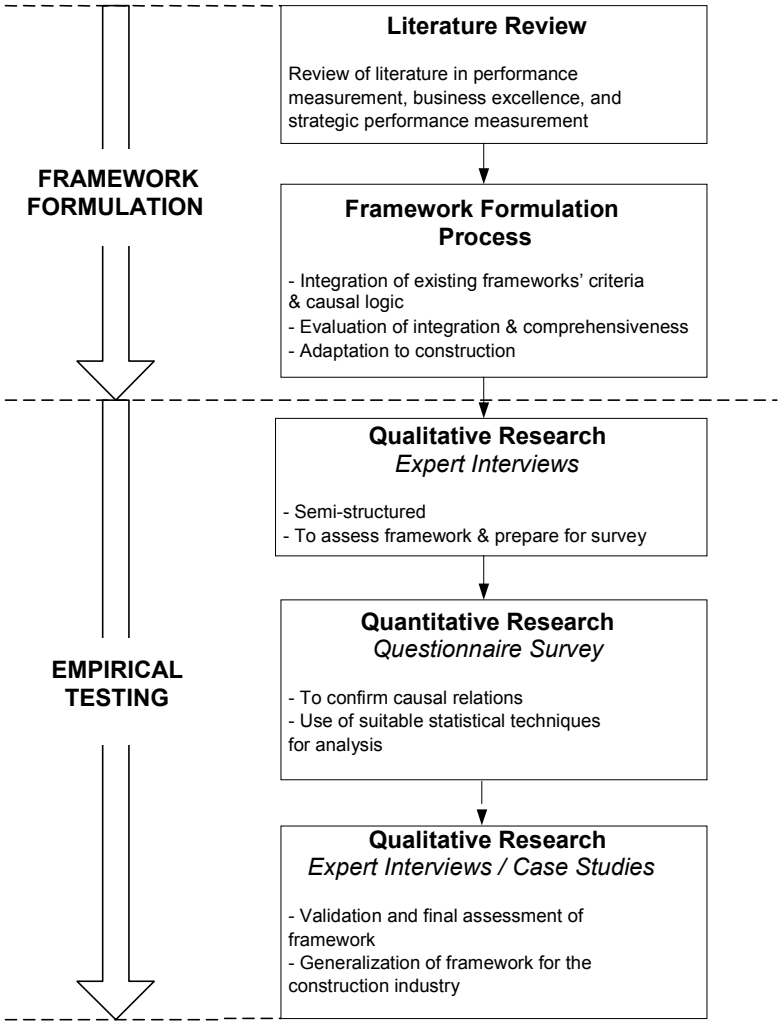

Figure 2: The research process

Framework Formulation Process

The literature review showed that existing performance frameworks are valid but not complete. Each views performance from a different aspect / facet. Therefore, it was logical to integrate the existing frameworks in order to develop a more comprehensive framework. Creating a new framework from scratch would only add to the existing confusion among frameworks.

Selection of the founding frameworks for integration was based on their popularity and establishment among researchers and practitioners to provide evidence of conceptual acceptance and applicability. The selected founding frameworks were the Balanced Scorecard and the business excellence models of the European Foundation for Quality Management (EFQM) and the Malcolm Baldrige Quality Award (MBNQA). Their popularity and establishment can be seen in Bassioni, Price and Hassan (2003), Kennerley and Neely (2002), Marr (2001), and Watson and Seng (2001). Furthermore, an industry survey reported by Robinson et al. (2002) showed the increased usage of the Balanced Scorecard and Excellence Models in UK construction firms. The KPI were not used for integration for their lack of a holistic approach and their constitution of indicators rather than performance dimensions /

areas. Nevertheless, the developed framework was compared to the KPI to ensure their inclusion. An example of this inclusion is shown later in the paper.

The process of formulation, shown in Figure 3, involved three basic steps: integration of the criteria; identification of causal relationships; adaptation to construction; and evaluation of integration and comprehensiveness. The first step integrates the criteria / dimensions of the founding frameworks into one list / set of criteria, thus achieving a more comprehensive and wider perspective of business performance measurement. This set included the criteria of leadership, strategic planning and management, customer and stakeholder focus, people management, partnerships and suppliers, resources management, processes, information and analysis, innovation, learning & knowledge management, customer results, people results, stakeholder results and business results.

The second step identifies the causal relationships between criteria of the proposed framework. The importance of this second step is that it shows how criteria (inputs) interact and produce performance results, thus assisting management in isolating performance problems, understanding their effects and consequently taking appropriate actions. The causal relationships of the founding frameworks and the literature review were the basis of this step. The criteria are arranged to show the logical business flow of: Leadership → Stakeholder focus →Strategic planning → Deployment → Results. Furthermore, the framework criteria were defined and some were regrouped based on relevant literature.

The third step of formulation evaluates the framework's integration and comprehensives. Integration was evaluated by comparing the proposed framework to its founding frameworks. This comparison showed the inclusion of founding framework's criteria / perspectives and consistency with their logic. Comprehensiveness was evaluated by comparing the proposed framework to a leading comprehensive performance measurement framework, the performance prism (Neely and Adams 2001), and the comparison revealed that the proposed framework covers the Performance Prism criteria as well as including two additional criteria and that it has clearer causal relationships. In addition, comprehensiveness was evaluated by comparing the proposed framework to TQM frameworks of Saraph et al. (1989), Flynn et al. (1994), Ahire et al. (1996), and Black and Porter (1996) which showed the proposed framework to constitute relevant business success dimensions.

Managerial initiatives that mainly originate within manufacturing are not necessarily appropriate for construction, because of the inherent differences between construction and other industries (Ahmed and Sein 1997 and Stockdale 1997). Thus, it was necessary to adapt the formulated framework to construction in the fourth and final step of formulating the framework. Adaptation was based on previous applications and adjustments of the founding frameworks when applied to construction, in addition to literature on the subject. Furthermore, the framework was compared to the construction KPI and the comparison revealed their inclusion within the framework. As a result of the formulation process, the proposed framework is shown in Figure 4.

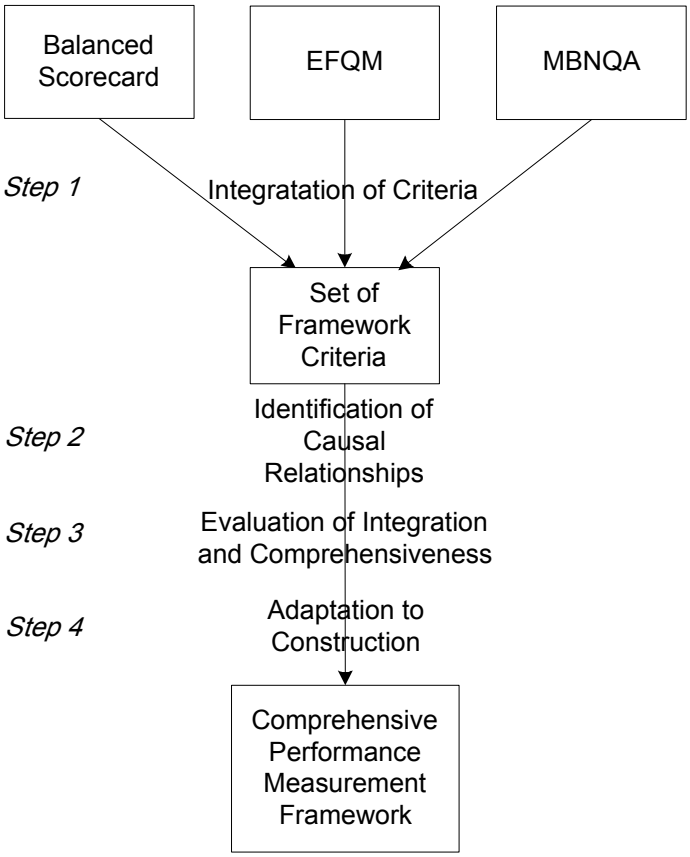

FIGURE 3: THE FORMULATION PROCESS OF THE PROPOSED FRAMEWORK VIA INTEGRATION

Expert Interviews

Expert interviews will be used to assess the framework and obtain preliminary feedback on its usefulness, practicality, applicability and comprehensiveness. The interviews also act as a basis for survey by providing feedback on criteria definitions and title/position of respondents. Based on these objectives, semi-structured interviews have been selected in preference to structured or unstructured interviews. This will ensure form to the interview but at the same time allow the interviewer some freedom to probe for information (Fellows and Liu 2003; and Hussey and Hussey 1997). The sample of the expert interviews is initially planned to be 5-8 interviews from different backgrounds.

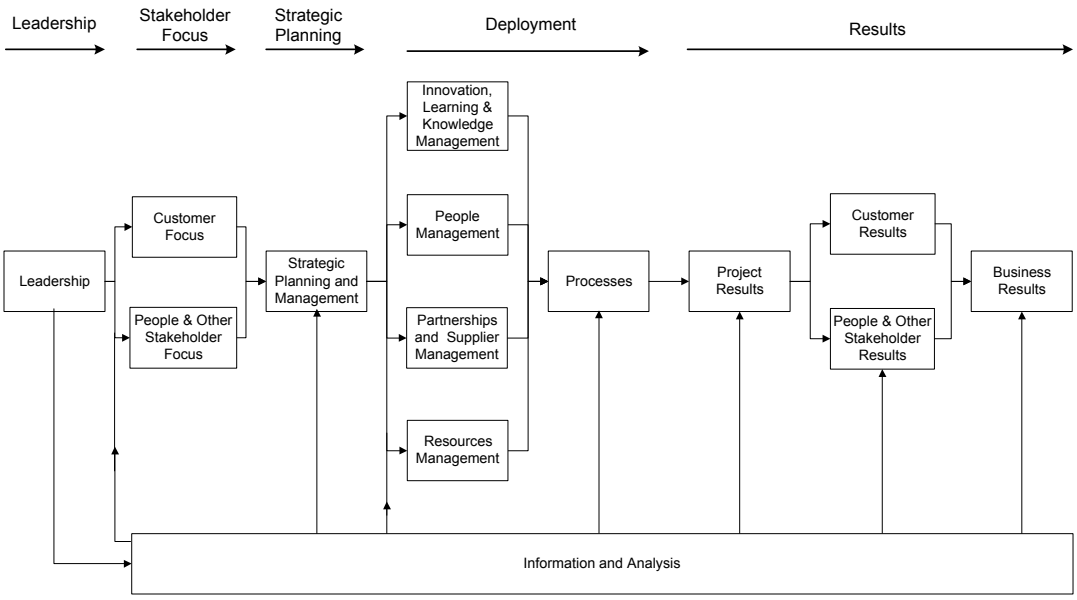

Figure 4: The proposed comprehensive performance measurement framework

Questionnaire Survey

The aim of the questionnaire survey in this research will be to confirm, reject or modify the causal relationships of the framework. Different aspects of conducting the questionnaire survey will be considered to obtain the best results in terms of statistical significance, validity and reliability.

Validation and Generalization

The use of statistical methods in the data analysis provides quantitative validation for the causal links of the framework. Nevertheless, further validation is required. The scientific and professional community need to show acceptability for the framework in what is termed as face validity (Pidd 2003 and Encyclopaedia of Science and Technology 2002). Usefulness, practicality, applicability and acceptance of the final framework and the possible generalization of scope to all types of construction organizations will be assessed within this step of validation. This is achieved through 5-6 semi-structured expert interviews and the possible use of case studies.

RESEARCH SCOPE

The development of the framework was performed on a general business basis and then adapted to construction by introducing relevant criteria such as the "project results" criterion. The literature used to adapt the framework for construction did not recognize the differences among construction segments or types of organizations. Therefore, on a theoretical basis, the framework was developed for the construction industry in general. However, the construction industry is internally composed of different types of organizations that are inherently different in their structure and management. For example, owner organizations are usually very different to contractors or engineering firms. In addition, the development of the framework might require several adjustments / enhancements throughout the stages of research.

Therefore, a proof of concept approach is used to test the framework on only one type of construction organization, which is chosen to be contractor companies. Generalization is assessed at the end of the research to evaluate possible use or modifications for other types of organizations. Future research can tackle other organization types and develop spin-off frameworks for each. Moreover, large organizations are targeted since evaluating some of the framework's criteria can be difficult in smaller sized organizations. Similarly, future simplified versions of the framework can be developed for smaller organizations, once the concept is proven. As a result of this discussion, the focus of the interviews and survey phases will be on large contractor type organizations, based on number of employees / turnover. The scope at different stages of the research is illustrated in Figure 5.

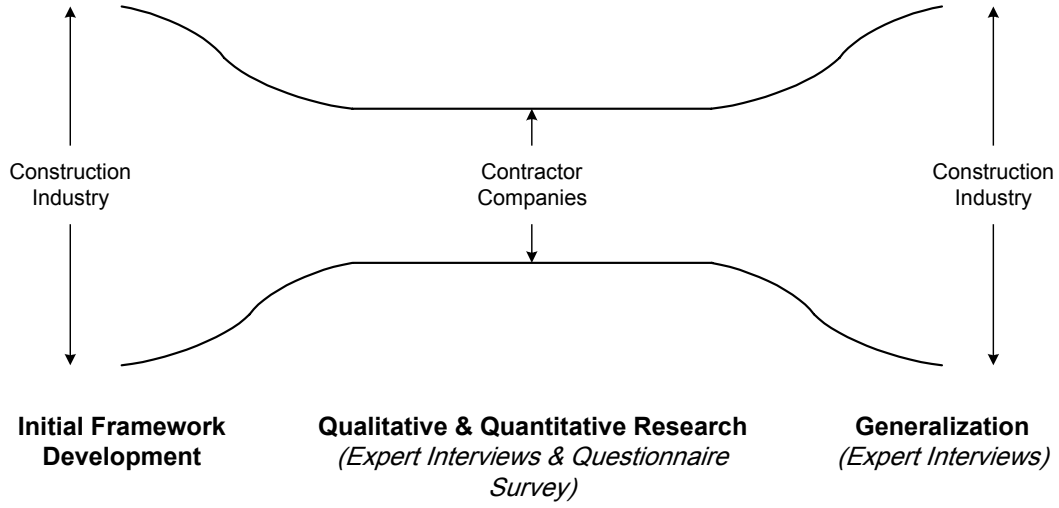

Figure 5: Research scope in the phases of research.

USING THE FRAMEWORK IN MEASURING BUSINESS PERFORMANCE

The proposed framework has fixed criteria and causal relations, but companies have flexibility in defining company-specific indicators for each criterion. The flexibility provided in this method of performance measurement suggests it to be a framework rather than a strict model. However, it is possible to develop standard indicators for each criterion and consequently use the framework for benchmarking purposes. The indicators used specified by companies can include the construction KPI (Construction Best Practice 2003), at the discretion of the company, as shown in Figure 6. For example, the KPI relating to projects such as cost and time predictability can be used in the 'project results' criterion. Environment - KPI such as impact on biodiversity and impact on environment indicators as well as respect for people – KPI that are result oriented such as employee satisfaction and turnover can be used in the 'people and other stakeholder results' criterion. Respect for people – KPI that are driver oriented such as pay and training can be situated in the 'people management' criterion. Furthermore client related KPI such as client satisfaction for products and services can be located in the 'customer results' criterion

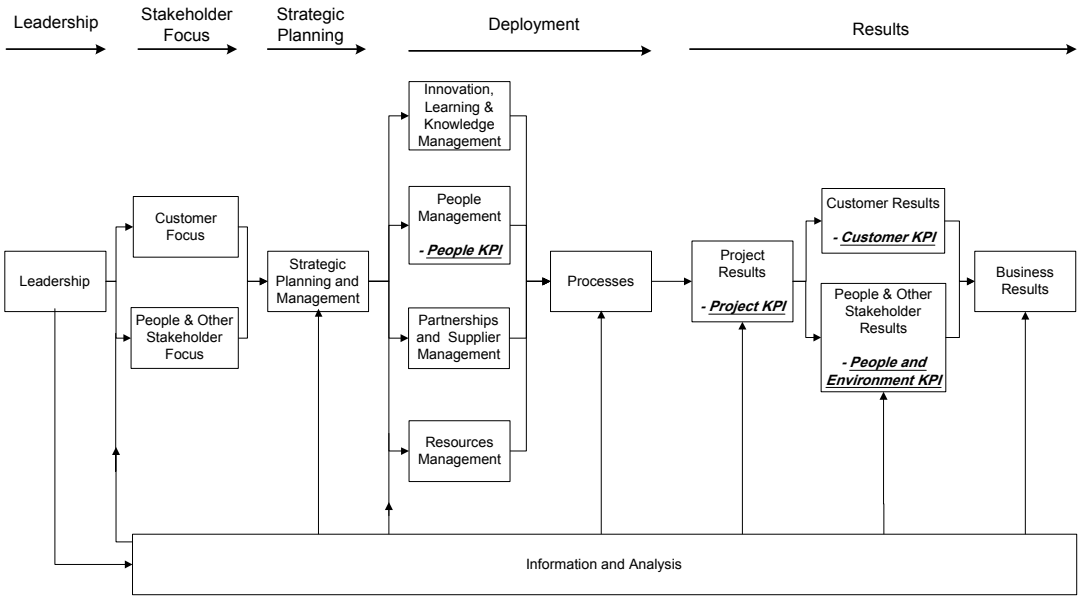

Figure 6: Example of the inclusion of the construction KPI in the proposed comprehensive performance measurement framework

CONCLUSION

There is a need for a single and comprehensive performance measurement framework that encapsulates the performance aspects of existing contemporary frameworks. This doctoral research aims to develop such a framework for construction companies. The paper in hand describes the research methodology followed in the research. A hypothetico-deductive approach has been adopted that divides the research into two stages: the framework formulation stage and the empirical testing stage. The research process is described in terms of these two stages. The first stage starts with a thorough literature review that is the basis of the framework development via integration of well-established frameworks. The literature review is also used to adapt the framework to construction and further guides the enhancement of the framework to differentiate measuring business excellence from strategic performance. The second stage of the research process is concerned with the empirical testing of the framework. This stage follows a triangulated approach of research methods that includes expert interviews and a questionnaire survey. Validation and assessment of the framework generalization over various types of construction organizations is conducted via expert interviews / case studies. The scope of the research is discussed during its different stages. Finally, the use of the framework in measuring business performance is overviewed as well as the possible inclusion of construction KPI within the framework.

The framework is expected to provide companies with a single tool that can be used to measure business performance in a more comprehensive manner than existing frameworks / methods. This will potentially save valuable time, money and resources associated with the use of more than one framework. Additionally, it can omit possible conflicting information resulting from measuring the same aspect in different ways. Furthermore, the framework gives a more comprehensive view of business performance than each of its founding frameworks and of other frameworks / methods such as the performance prism and construction KPI. It assists managers in identifying specific problem areas and their effects on business performance thus, taking better

and more effective decisions and improving the overall business performance of the organization.

REFERENCES

Ahire, S. L., Golhar, D. Y. and Waller, M. A. (1996) Development and validation of TQM implementation constructs. *Decision Sciences*. 27 (1), pp. 23-56.

Ahmed, I. U. and Sein, M. K. (1997) Implementing TQM principles in construction projects: difficulties and remedies. *International Conference on Leadership and Total Quality Management in Construction and Building*, Singapore.

Bassioni, H. A., Price, A. D. F. and Hassan, T. M. (2003) Business performance measurement in construction firms. Accepted for publication, *Journal of Management in Engineering*, ASCE, USA.

Black, S. and Porter, L. J. (1996) Identification of the critical factors of TQM. *Decision Sciences*. 27 (1), pp. 1-21.

BNQP (2002) *Criteria for Performance Excellence*. Baldrige National Quality Program, National Institute of Standards and Technology, Department of Commerce, USA.

British Quality Foundation (2002) *The Model in Practice – Using the EFQM Excellence Model to Deliver Continuous Improvement*. The British Quality Foundation. London., Irwin, Chicago, USA.

Construction Best Practice (2003) *Construction Industry Key Performance Indicators.* Construction Best Practice, Watford, UK.

Encyclopaedia of Science and Technology (2002) *Encyclopaedia of Science and Technology*. McGraw-Hill, New York, USA.

Fellows, R. and Liu, A. (2003) *Research Methods for Construction*. Blackwell Science, Oxford, UK.

Flynn, B. B., Schroeder, R. G. and Sakakibara, S. (1994) A framework for quality management research and an associated measurement instrument. *Journal of Operations Management*. 11, pp. 339-366.

Hussey, J. and Hussey, R. (1997) *Business Research: A Practical Guide to Undergraduate and Postgraduate Students*. Macmillan Press, London, UK.

Kaplan, R. S. and Norton, D. P. (1992) The balanced scorecard – measures that drive performance. *Harvard Business Review*, January-February pp. 71-79.

Kaplan, R. S. and Norton, D. P. (1993) Putting the balanced scorecard to work. *Harvard Business Review*, September-October pp. 134-147.

Kaplan, R. S. and Norton, D. P. (1996) Using the balanced scorecard as a strategic management system. *Harvard Business Review*, January-February pp. 75-85.

Kennerley, M. and Neely, A. (2002) Performance measurement frameworks: A review. *Business Performance Measurement: Theory and Practice*. Ed. Neely, A. Cambridge University Press, Cambridge, UK.

Marr, B. (2001) Scored for life. *Financial Management*. April, p. 30.

Neely, A. (1999) The performance revolution: why now and what next? *International Journal of Operations & Production Management*, 19 (2), pp. 205-228.

Neely, A. and Adams, C. (2001) The performance prism perspective. *Journal of Cost Management*. January/February, pp. 7-15.

Pidd, M. (2003) *Tools for Thinking: Modelling in Management Science*. John Wiley and Sons, West Sussex, England.

Robinson, H. S., Carrillo, P. M., Anumba, C. J., Al-Ghassani, A. M. (2002) Business Performance Measurement and Improvement Strategies in Construction Organizations. *Unpublished Paper*. Loughborough University, Loughborough, UK.

Royer, I. and Zarlowski, P. (2001) Research design. In: Thietart et al., eds., *Doing Management Research: A comprehensive Guide*, Sage Publications, London, UK.

Saraph, J. V., Benson, P. G. and Schroeder, R. G. (1989) *Decision Sciences*. 20 (4), pp. 810-829.

Stockdale, D. J. (1997) Can total quality management 'add value' in construction? *Construction Papers*. Ed. Harlow, P. The Chartered Institute of Building. Ascot, UK.

Vittikh, V. A. (1997) Engineering theories as a basis for integrating deep engineering knowledge. *Artificial Intelligence in Engineering*. 11, pp. 25-30.

Watson, P. and Seng, L. T. (2001) Implementing the European Foundation for Quality Management Model in construction. *Construction Information Quarterly*. Construction paper 130.