

CIB2007-036

Stakeholder Perceptions of Contractor Time, Cost and Quality Management on Building Projects

Kathy Michell, Paul Bowen, Keith Cattell,
Peter Edwards and Rob Pearl

ABSTRACT

Clients of the construction industry are primarily concerned with the quality, time and cost of construction projects. This paper seeks to explore how the effectiveness of Contractor time, cost and quality management associated with different building procurement systems is perceived by those involved in project teams. A questionnaire survey is used to elicit the opinions of South African clients, contractors and building professionals. The findings indicate that building professionals have little faith in the effectiveness of contractors' time and quality monitoring and control procedures.

KEYWORDS Contractor, TCQ management, South Africa

1. INTRODUCTION

A primary concern of construction clients is that their projects are completed within budget, on time, and at the required level of quality. Despite this objective, the majority of construction projects are procured on the basis of only two of these parameters, namely: time and cost (Bennett and Grice, 1990). This is perhaps understandable since the majority of project management control systems highlight time and cost, and overlook the relative importance of quality (Hughes and Williams, 1991). It is argued by Herbsman and Ellis (1991) that the major failings in traditional approaches to project delivery have been extensive delays in the planned schedules, cost overruns, serious problems in quality, and increases in the claims and litigation associated with construction projects.

To facilitate project success, the three parameters of time, cost and quality should be considered together. Hughes and Williams (1991) propose that these factors are the three points of a triangle and that neglecting one factor will have a corresponding detrimental effect upon the other two. Lansley (1993) argues strongly for studying the behavioural aspects of management in addressing the problems facing the construction industry i.e., that it is the 'human factor' involved in construction projects that needs to be addressed. Rwelamila and Hall (1995) argue that little evidence exists of successful projects where these three factors have been technically balanced and that there is a need to embrace time, cost and quality management as a 'human activity system'.

The purpose of this paper is to explore how contractors' time, cost and quality management on building projects is perceived by those involved in project teams.

2. TIME, COST AND QUALITY (TCQ) MANAGEMENT IN THE ATTAINMENT OF CLIENT OBJECTIVES

Ireland (1983) argues that time, cost and quality are the principal feasible objectives of the client in any construction project. Although it is claimed that time, cost and quality are incorporated in the management of construction projects, research has shown that in fact a time-cost bias exists (Bowen *et al.*, 1999).

2.1 Time

Timely completion of a construction project is frequently seen as a major criterion of project success by clients, contractors and consultants alike. Newcombe *et al.* (1990) note that there has been universal criticism of the failure of the construction industry to deliver projects in a timely way (Nkado *et al.*, 1999). NEDO (1983) states that a disciplined management effort is needed to complete a construction project on time, and that this concerted management effort will help to control both costs and quality. This is tantamount to saying that the client's objectives can be achieved through a management effort that recognises the interdependence of time, cost and quality.

2.2 Cost

Clients are concerned with the overall profitability of projects and the accountability of projects generally. Cost overruns, in association with project delays, are identified as one of the principal factors leading to the high cost of construction (Charles and Andrew, 1990). Research to date has tended to focus on the technical aspects of managing costs on

construction projects in the attainment of the client objectives. There is little evidence of a concern regarding contractors' management of clients' costs.

2.3 Quality

To the client, quality may be defined as one of the components that contributes to "value for money" (Flanagan and Tate, 1997). Vincent and Joel (1995) define total quality management as:

"...the integration of all functions and processes within an organisation in order to achieve continuous improvement of the quality of goods and services. The goal is customer satisfaction."

Furthermore, in order to achieve successful project quality management three separate drivers to quality management must be managed:

- Integration of the project team so as to have a single objective and a common culture;
- A customer focus for the team thereby facilitating the provision of products and services that will meet the clients needs; and
- A process of continuous improvement in the management of the construction project.

When these three components are successfully integrated, the project will begin to realise significant, measurable and observable improvements in the attainment of the client's objectives. An analysis of the perceptions held by clients, contractors and building professionals, concerning Contractor management of time, cost and quality will inform this debate. This is done through an opinion survey.

3. THE SURVEY

3.1 The focus of the study

The effective management by the contractor of project time, cost and quality (TCQ) is intrinsically important to the attainment of client objectives. In order to examine this causal link, the opinions of building procurement project team members in South Africa were obtained by means a national questionnaire survey. The questions sought to establish their perceptions concerning contractor management of project time, cost and quality within different procurement systems on building projects.

3.2 Methodology

A stratified mail questionnaire opinion survey was conducted on clients, architects, quantity surveyors, consulting structural engineers, project managers, and general contractors. Questionnaires were sent to practices and organisations rather than to individuals, using the relevant membership directories of professional associations. A total of 180 questionnaires were distributed, comprising 30 from each sub-group. One hundred and forty-three replies were received (79.4%). The questions for each of the six groups of participants were designed to facilitate an inter-group comparison. The intention of the survey was to reveal areas of concern for the industry within the process of contractor project time, cost and quality management rather than to provide hard evidence of inter-group differences between members of the design team.

3.3 Survey results

For discussion purposes, the various procurement systems have been grouped together into three generic types: conventional (traditional, negotiated, cost-plus); design and build (design and build, package deal, turnkey, develop and construct); and management-orientated (management contracting, construction management, design and manage) (Masterman, 1992). The conventional method of building procurement is reported by nearly 70% of respondent clients in South Africa to be the most widely utilised procurement system. The management-orientated (21%) and design and build (9%) systems enjoy considerably less usage. The results are discussed question by question and compare differences between groups.

Question 1: *Please indicate whether clients are realistic with respect to expectations of time, cost and quality at the outset of the project. (Answer choice = all/most/some/none of the time)*

Clients' and consultants' opinions differ markedly, with a large majority of clients believing their expectations to be realistic (see Table 1). The most pessimistic view of clients' expectations is held by architects, with only clients' quality expectations receiving a majority affirmative response. This is probably attributable to the control over quality which architects perceive themselves to hold as principal agents for the client.

Contractors are optimistic about the reality of client expectations for project time and quality. An explanation for this view of project time is not readily forthcoming, given that, for most conventional procurement systems, the contract period is not part of the contractor's bid but stipulated in advance by the client. Contractors' pessimistic views of the reality of client cost expectations is probably explained by their (the contractors) having to seek work in a highly competitive market.

Table 1. Perceived extent to which clients are realistic, all or most of the time, with respect to their expectations of project time, cost and quality objectives at the outset of the project

<i>Project factor</i>	<i>% of respondent groups believing client objectives are achieved all or most of the time</i>						
	All	Clients	Architects	Quantity	Engineers	Project	Contractors
	(%)	(%)	(%)	surveyors (%)	(%)	managers (%)	(%)
Time	57	90	33	67	47	60	63
Cost	57	70	44	83	41	72	46
Quality	74	80	65	83	59	84	79

Question 2: *To what extent are clients' objectives with respect to time, cost and quality (as laid down in the brief) achieved on building projects? (Answer choice: always/sometimes/never)*

As depicted in Table 2, project managers and contractors are the only respondent groups to exhibit at least one majority positive response in each of their procurement system/TCQ matrices. The majority of project managers believe that client time, cost and quality objectives are always achieved under management-oriented procurement systems. A smaller majority believe that time and cost objectives (but not quality) are always achieved under design-build systems, while a larger majority believe that only quality objectives are always achieved under conventional procurement systems. Contractor respondents are most confident about their ability to always meet client cost objectives under design-build procurement systems; which might be expected, given the nature of these systems, but they are pessimistic in every other respect for all procurement systems. All other respondent groups are generally pessimistic about the capacity of any procurement system to always achieve any of the client's TCQ objectives.

Table 2. Perceptions about whether client objectives with respect to time, cost and quality (as laid down in the brief) are always achieved on building projects (C = Conventional; D = Design and Build; M = Management oriented procurement systems)

Project factor	% of respondent groups believing that client objectives are always achieved																	
	Clients			Architects			Quantity surveyors			Engineers			Project Managers			Contractors		
	C	D	M	C	D	M	C	D	M	C	D	M	C	D	M	C	D	M
Time	22	40	0	21	13	31	24	50	35	7	17	4	46	52	73	18	41	47
Cost	33	40	20	22	27	27	25	32	8	4	29	4	46	52	59	10	59	41
Quality	11	20	0	32	14	27	50	5	8	25	13	13	64	38	62	43	35	35

Question 3: What proportion of contractors use in-house procedures to monitor and control the project with respect to time, cost and quality? (Answer choice =all/most/some/none)

With reference to Table 3, contractors and project managers are the most optimistic about the proportion of contractors using in-house procedures to monitor and control project time, cost and quality. Their opinion is matched by quantity surveyors and engineers with respect to time and cost control procedures, but not with respect to project quality; a view shared by client respondents. The most pessimistic view is held by architect respondents, the majority of whom believe that only cost monitoring and control procedures are used by the vast majority of contractors. It can be concluded that the design and cost consultants have little faith in the existence, let alone the effectiveness of, contractors' own time and quality monitoring and control procedures.

Question 4: How would you rate sub-contractor performance in terms of time of construction and quality of work? (Answer choices: good/satisfactory/poor)

A weakness inherent in this question is that it assumes that sub-contractor performance is consistent, as it fails to specify any proportion of projects. Notwithstanding this shortcoming, it can be seen from Table 4 that few respondents were prepared to perceive sub-contractor time and quality performance as good, but most rated it as satisfactory (see Table 4).

Table 3. Perceptions of whether all or most contractors use in-house procedures to monitor and control the project with respect to time, cost and quality

<i>Project factor</i>	<i>% of respondent groups who believe all or most contractors use in-house time, cost and quality monitoring/control</i>						
	All	Clients	Arch	QS	Engineers	Project managers	Contractors
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Time	71	70	39	73	67	92	83
Cost	80	90	61	80	70	100	88
Quality	56	40	39	57	37	84	75

Table 4. Sub-contractor performance perceived as being good with regard to the time and quality of construction work

<i>Project factor</i>	<i>% of respondent groups who believe sub-contractor time and cost performance is good</i>						
	All	Clients	Arch	QS	Engineers	Project managers	Contractors
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Time	18	10	22	17	10	32	13
Quality	10	10	22	10	0	20	0

Question 5: *To what extent do contractors use the following techniques to monitor and control the time aspect of building work? (Answer choice: all/most/some/none of the time)*

The validity of this question hinges on the assumption that the other respondent groups, by virtue of their interaction with the contractor during the project, are in a position to offer an informed opinion. As depicted in Table 5, bar chart methods are clearly thought (by a large majority of respondents in each category group) to be the technique most frequently used by contractors to monitor and control project time performance. Fewer respondents believe that contractors use critical path methods for this purpose at least frequently. Very few respondents believe that contractors make frequent use of PERT or line of balance techniques to monitor and control project time.

Table 5. Perceptions of whether contractors use the following techniques all or most of the time to monitor and control the time aspect of building work

<i>Project monitoring/ control technique</i>	<i>% of respondent groups who believe technique is used all or most of the time by contractors</i>						
	All	Clients	Arch	QS	Engineers	Project managers	Contractors
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Bar chart method	89	90	79	85	93	100	86
CPM	53	60	44	44	45	62	68
PERT	11	0	18	8	11	10	15
Line of balance	5	0	11	0	4	5	6

Question 6: Does the contractor provide the consultants with a bar chart/network at the outset for the activities and timing of the project? (Answer choice: always/sometimes/never)

With reference to Table 6, only project managers and contractors exhibit a majority view that contractors always provide the project consultants with a bar chart or activity network at the outset of a project. The client group is most pessimistic about this. This finding suggests that if clients and consultants believe this resource should be available at the outset, then they should ensure that the contractor complies with this requirement as stipulated in the contract documentation.

Table 6. Perceptions about whether contractors always provide consultants with a bar chart/network at the outset for the activities and timing of the project

<i>Project issue</i>	<i>% of respondent groups who believe contractors always provide time performance plan</i>						
	All	Clients	Arch	QS	Engineers	Project managers	Contractors
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Provision of bar chart / network by contractor	51	30	42	35	47	72	78

Question 7: *If a bar chart is provided by the contractor, is this discussed between the contractor and consultants and regularly updated? (Answer choice: always/sometimes/never)*

This question covered two issues; the discussion of bar charts, and the regular updating thereof. As seen in Table 7, comparatively fewer architects, quantity surveyors and engineers, compared to other respondent groups, believe that contractor bar charts or activity networks are always discussed and updated, and all respondent groups believe that updating of bar charts happens infrequently at best. Future research should explore why this appears to be so, given the importance of monitoring and controlling project time performance in the attainment of client objectives.

Table 7. Perceptions about whether the bar chart/network (provided by the contractor) is discussed between the contractor and the consultants and regularly updated

<i>Project issue</i>	<i>% of respondent groups who believe bar chart is always discussed and regularly updated</i>						
	All	Clients	Arch	QS	Engineers	Project managers	Contractors
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Discussed	64	60	74	56	43	76	77
Regularly updated	47	50	39	41	37	60	59

4. CONCLUSIONS

It is clear that the practice of time, cost and quality management by South African contractors on construction projects is not perceived by project stakeholders to be as comprehensive nor as effective as the literature suggests. Considerable room for improvement exists concerning the use of sophisticated methods of control such as a critical path (CPM) approach. The provision and frequency of updating of progress charts are other issues, as is the control of sub-contractors. Contractors in South Africa should heed these concerns and take appropriate action if mutual trust and satisfaction is to be achieved between project stakeholders.

5. References

- Bennett, J. and Grice, T. 1990 *Procurement systems for building*. In *Quantity Surveying Techniques: New Directions* (edited by P.S. Brandon), 243-262. (Oxford: Blackwell Scientific Publications).
- Bowen, P.A., Pearl, R.G. and Edwards, P.J. 1999 Client briefing processes and procurement method selection: a South African study. *Engineering Construction and Architectural Management*, Vol.6, No.2, pp.91-104.
- Charles, T.J. and Andrew, M.A. 1990 Predictors of cost-overrun rates. *Journal of Construction Engineering and Management*, ASCE, **116**, 548-552.
- Flanagan, R. and Tate, B. 1997 *Cost Control in Building Design*. (Oxford: Blackwell Science).
- Herbsman, Z. and Ellis, R.D. 1991 The cost/time/quality integrated bidding system - an innovation in contract administration. In *Management, Quality and Economics in Building* (edited by A. Bezelega and P.S. Brandon), 150-161. (London: E. & F.N. Spon Ltd.).
- Hughes, T. and Williams, T. 1991 *Quality Assurance*. (Oxford: BSP Professional Books).
- Ireland, V. 1983 *The Role of Managerial Actions in the Cost Time and Quality Performance of High Rise Commercial Building Projects*. Unpublished PhD Thesis, University of Sydney, Sydney.
- Lansley, P. 1993 Towards improved managerial effectiveness. In *Proceedings of the CIB W-65 International Symposium on "Organisation and Management of Construction"*, Trinidad, 671-679.
- Masterman, J.W.E. 1992 *An Introduction to Building Procurement Systems*. (London: E & FN Spon).
- N.E.D.O. 1983 *Faster Building for Industry*. National Economic Development Office (London: Her Majesty's Stationery Office).
- Newcombe, R., Langford, D. and Fellows, R. 1990 *Construction Management 2*. (London: Mitchell).
- Nkado, R.N., Akintoye, A., Bowen, P.A. and Pearl, R.G. 1999 Forecasting construction time by quantity surveying practices in South Africa. *Urban Forum*, Vol.10, No.2, pp.165-182.
- Rwelamila, P.D. and Hall, K.A. 1995 Total Systems Intervention: an integrated approach to time, cost and quality management. *Construction Management and Economics*, 13, 235-241.
- Vincent, K.O. and Joel, E.R. 1995 *Principles of Total Quality*. (London: Kogan Page).