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Objectives and performance in construction projects

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This paper considers the problems associated with the identification and use of project-related objectives held by a project-owning, client organization. It is argued that the evaluation of projects, contractors, professionals or procurement methods solely on the extent to which client objectives are achieved is problematic. Difficulties include setting objectives at an appropriate level, allowing for uncertainty and interdependencies between objectives, and measuring the achievement of objectives. Proper evaluation and improvements in performance require an examination not just of project objectives but also of the processes involved in pursuing them.

Keywords: Objectives, project performance, management contracting.

Introduction

The motivation for this paper was research carried out by the authors into the roles, risks and responsibilities of management contracts in the construction industry. A major concern was the relative merits of management contracting over other forms of construction procurement in meeting the requirements of client organizations. This raised the question of how different procurement methods, and by implication the performance of various parties working under different contractual arrangements, could be compared in a meaningful way.

A common approach is to evaluate performance on the extent to which client objectives like cost, time and quality were achieved. This evaluation may be undertaken by the client, other involved parties, or observers in the marketplace. The significance of such project evaluations is that they influence market perceptions about the effectiveness of particular procurement methods, and the various contracting parties.

Assessing project performance on the basis of achievement of client objectives is intuitively appealing, but not without significant practical difficulties. Essentially, these include the problem of measuring goal attainment, allowing for trade-offs, effects due to external factors, and whether goals were set at an appropriate level. One important consequence is that comparing the performance of management contracting and other forms of procurement in terms of the achievement of objectives as measured by criteria like time or cost can be very misleading.

This paper first looks at the role and nature of client objectives in a project setting. It next discusses the problems involved in setting appropriate objectives or goals for achievement, and the complications introduced by interdependencies between objectives. Subsequent sections consider implications for the evaluation of projects, contracting parties and procurement methods.

The discussion here focuses on construction projects and management contracting. However, most – if not all – of the problems identified are present to a greater or lesser extent in any project involving contracting parties.

The role of client objectives

Figure 1 shows the main linkages between client objectives, evaluation of project performance and methods for procuring project performance. At the inception stage, the client identifies a general set of value-for-money criteria based on experience and advice. The client then formulates a view of target levels of attainment or objectives for each criterion based on the nature of the project, experience and advice.

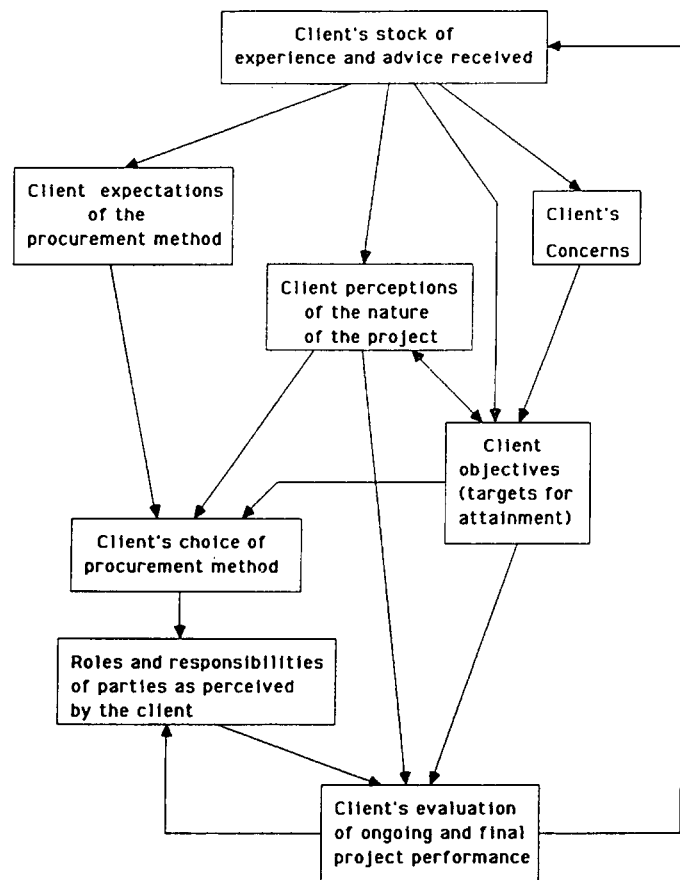


Fig. 1. The role of client objectives.

Objectives are needed so that appropriate courses of action can be taken for their attainment. This involves the client in:

- choice of a procurement method;
- communicating what is required to contracting parties (including professionals where appropriate); and
- periodically guiding the execution of the project by making decisions about process issues.

While the project is proceeding and on completion of the project, objectives are used to evaluate the success of the project. This involves the *client* deciding, perhaps subjectively, the extent to which objectives are being or have been met. Objectives may have to be revised in the light of ongoing performance and changing market conditions.

It follows that behaviour is required from professionals and contractors that is aimed at achieving these objectives. This implies a need for clearly specified client objectives, a method of setting appropriate levels of objectives and procurement systems that facilitate their achievement. As Fig. 1 indicates, the choice of procurement method is influenced by the nature of the project, client objectives and client expectations of the procurement method.

Client expectations of procurement methods are based on the client's experience with previous projects and associated procurement methods, and professional advice that is in turn based on experience and market perceptions of different procurement methods. This information may be misleading, ill-informed or biased, particularly if it is derived from naive assessments of goal attainment on previous projects.

The nature of client objectives

In general terms, the objectives of a client embarking on a construction project can be stated quite simply. The client wishes to have a structure that looks and functions as intended and that provides an acceptable return for the money expended. These general aims are normally considered to be achievable if attention is concentrated on the three factors of cost, time and quality. These three factors might be usefully subdivided in many situations as follows:

- *Cost*: initial expected capital cost and subsequent expected maintenance costs.
- *Time*: expected time required for design and construction.
- *Quality*: expected quality expressed in terms of technical specification, function and appearance (Walker, 1984).

In addition to the cost, time and quality considerations, an important concern, often based on past experience, is the quality of the relationships with the other participants. Looking back on the conduct of a project, what sticks in the mind is often not so much financial success or early completion, but memories of other people involved and abiding impressions of harmony, goodwill and trust or, conversely, of arguments, distrust and conflict. The client's willingness to pursue a given procurement route to achieve a future project is likely to be strongly influenced by these factors. Other participants, who are looking for further business with the client, should have them very much in mind. Nahapiet and Nahapiet (1985) reported research findings which did not reveal any clear relationship between the satisfaction expressed by clients and project performance assessed in absolute terms, such as

cost per unit of floor area, or floor area constructed per unit of time. Other factors such as the smoothness and efficiency with which the industry fulfils the client's needs can play a large part in his or her judgement of the level of success. Such concerns might be thought of as a general concern to minimize hassle.

A factor that can be of considerable importance to a client undertaking projects in industries that are subject to rapid developments and changes is the ease with which the client can update the design and alter the construction work while it is in progress. Some projects need to display or contain the latest technology. The building process has a long gestation period and layouts and fittings appropriately selected at an early stage of the design often become outdated. A new tenant may need different facilities from those already incorporated. New materials and styles of appearance and usage may become available for consideration, and a client can benefit from having the ability to incorporate these at a late stage. The client may judge project success on the basis of having the most advanced and up-to-date features in his project, and this could outweigh all other factors in his assessment. Of primary importance to such a client is the need to adopt a system of procuring the construction works that allows maximum flexibility to make changes without incurring excessive penalties in cost, time and disruption.

Finally, clients may be concerned about the level of uncertainty associated with cost, time, quality, hassle and flexibility. Frequently, this concern amounts to a wish to minimize uncertainty of all kinds.

Setting objectives

Whatever objectives are set, there is a need for realistic levels, otherwise contractual parties will not be fully motivated to achieve them. At the same time, it is in the client's interests to set objectives that are challenging. Tight but achievable goals ought to act as a control on contractors and professionals, encouraging them to employ their 'best endeavours'. Detailed risk analysis can be helpful here. Explicit recognition and assessment of risks enables objective setting to reflect exposure to risks. Thus objectives may be set that are conditional on the non-occurrence of specified risks or that include contingency allowances, and revised targets may be agreed if these risks are realized.

The above observations imply a need for very detailed planning and explicit recognition throughout the project of the achievement of cost, time, quality, flexibility and other objectives. However, the qualitative nature of some value-for-money criteria, such as quality and flexibility, and the uncertainty inherent in any project plan, means that setting finely judged, challenging but achievable objectives may be very difficult.

Relying on market forces to set objectives, e.g. by accepting the lowest fixed price bid, is one way of fixing a cost objective. This is likely to produce a challenging objective for the contractor, but it may not be considered attainable once the project is underway. Several studies have concluded that selecting the lowest fixed price bid often means the selection of the contractor who has most underestimated the complexity of the work or who has made the most mistakes in pricing the work. The concept of the 'winner's curse' is well known.

Determining a suitable time-related objective can also be difficult. Clients' expectations of the time needed for pursuing a particular type of development are normally based either on their own experience of similar works or on advice received from specialist advisers. To the extent that a new project is not the same as any predecessor due to differences in location,

ground conditions, access, availability of resources and other environmental factors, project durations will be uncertain. Inexperienced clients are very dependent upon their professional advisers, who may argue for a short completion time in order to persuade their client to go ahead, or a long completion time to facilitate an easy pace and a claim of time saving on completion.

Objective setting also requires a clear, unambiguous statement of quality-related objectives in the form of detailed specification of works, and roles and responsibilities of contractors and professionals. Even then, uncertainties inherent in project execution may produce uncertain deviations from these objectives, particularly when indirect as well as direct effects are taken into account. An assessment of the implications of these uncertainties requires further detailed appraisal in the form of risk analysis. This may be impractical or not considered cost-effective for some projects, but may be essential for others.

In recognition of project uncertainty, objectives may be modified as the project progresses. For example, a progressive refinement of cost targets typically takes place as a project moves through the uncertainty of the exploratory and feasibility stages into detailed design. It is only when the design is complete that a reasonably clear idea of construction costs will emerge. Even so, costs will depend on contractors' pricing levels and any adjustments that have to be made for variations to the design and unforeseen problems.

Interdependencies between objectives

If the level of attainment on each objective is independent of levels attained on other criteria, any client might be expected to seek maximization of quality, assistance and flexibility, and to seek minimization of cost, time, uncertainty and hassle. However, these objectives are interdependent, and potentially incompatible. Therefore, in setting goals for attainment on each objective, trade-offs must be made between levels of attainment on each objective. In particular, it has long been recognized that some degree of trade-off is likely when setting objectives in respect of time, cost and quality. For example, Barnes (1988) represents these three objectives as the vertices of an equilateral triangle, and suggests that the combination of objectives in any particular project can be designated by a point within the triangle, such that an emphasis on any one objective pulls the focus of attention away from one or both of the others.

Unfortunately, the problem of trade-offs is in most cases complicated by uncertainty about the nature of interdependencies between the different value-for-money criteria. To simplify the problem, consider the three basic criteria of time, cost and quality. The potential pair-wise effects of one upon another are shown in Fig. 2. As Fig. 2 indicates, pair-wise effects do not always work in one direction, and may depend on the circumstances. A decrease in the time taken to complete a project can cause an increase in total project cost, but it may cause a decrease. Similarly, improvements in quality can mean an increase or a decrease in project time associated with an increase or a decrease in project cost.

Setting different levels of cost, time or quality objectives can have varying effects on the achievement of the other objectives. These effects depend on a variety of situational factors, not least of which are the nature of the project and the behaviour of the contractors and professionals employed. For example, good quality building work is fostered by allowing contractors time to analyse and properly price what is required, and to conduct the work without excessive haste and paring of costs.

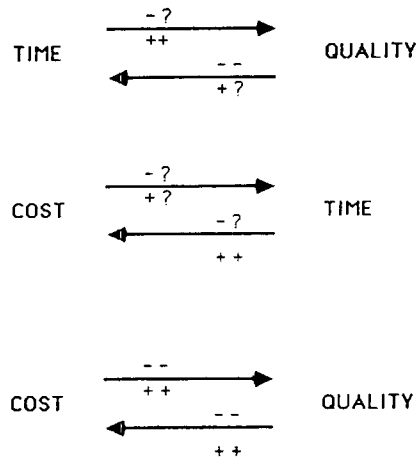


Fig. 2. Interdependencies between time, cost and quality.

Faced with these factors and a concern with several value objectives, clients and other parties involved in construction procurement usually adopt a pragmatic approach. For example, the client's representative on the building site might accept work of lower performance than specified in the contract where specifications appear excessively tight, in exchange for work of higher performance in other areas, to secure an overall balance in the terms of exchange. Literal enforcement of the contract terms in each such instance might otherwise lead to disruptions or work stoppages which would not be in the client's best interests (Reve and Levitt, 1984). Project objectives are often expressed in terms of satisfying target levels of achievement, which are assumed to be mutually compatible.

Trade-offs may be expressed simply in terms of one objective having clear priority over another. For example, under JCT 87 Management Contract conditions there is an implied instruction to the management contractor to put completion on time before cost control (Joint Contracts Tribunal, 1987b, p. 5). Any trade-offs of time against other project objectives require agreement between the client and management contractor on an *ad hoc* basis.

In setting one project-related objective, it is important to understand what the implications are for other objectives. This can only be achieved by breaking down the project into component activities and building up project goals from plans associated with the components. Trade-offs between elements of cost, time and quality need to be considered in more detailed form: costs in terms of capital and future maintenance costs; time in terms of design time and construction time; quality in terms of technical specification, function and appearance; and flexibility in terms of ability to incorporate alterations both during and after construction.

Project evaluation

As has already been suggested, a project tends to be assessed by all involved parties by the extent to which their own objectives are achieved or surpassed. This goal approach to performance evaluation has a number of significant weaknesses.

One problem is measuring achievement of objectives. For example, achievement of criteria such as flexibility and quality may be very difficult to measure. How much flexibility is provided may be particularly difficult to assess if the flexibility provided has not been fully utilized. Quality achievement may be assessable by checking whether the works conform to original plans and specifications, but what of care in construction associated with invisible aspects which may only be assessable in the longer term?

Another problem is one of complexity and interaction (Mohr, 1982). One aspect is the interdependencies of objectives already discussed in the context of client objectives. *If* the realization of one goal inhibits attainment of another (and as we have seen even this is unclear), then there is a need to know what trade-offs have taken place to produce the completed project, and how the achievement of one objective is valued in comparison with the achievement of another. It seems that most clients do not explicitly value such trade-offs when setting objectives. It seems even fewer do so at project completion, let alone on a consistent basis over time related to initial assessment.

A second aspect of complexity and interaction is that performance of the procurement process is affected by the external context, especially by the other activities or projects that parties are engaged in. What it takes to get a job done may depend on what else the parties concerned are trying to accomplish at the same time (Mohr, 1982). Failure to achieve certain objectives, or over-achievement of objectives, may be the result of events beyond the contractors' or professionals' control. For example, extremely adverse or fortuitous weather conditions, or the sudden loss of key personnel, may have a dramatic effect. In principle, such events might be taken into account when comparing project out-turns with original objectives. Alternatively, objectives ought to be revised during the project in the light of such uncontrollable developments. In practice, such revisions do take place but negotiations concerning adjustments may result in inadequate adjustments or compromise.

A third problem with a goal attainment approach to performance assessment is the problem discussed earlier of setting objectives at an appropriate level. Apparent success in terms of meeting or exceeding an objective may just reflect an easily achieved objective. For example, a large number of road contracts are publicized as finishing well ahead of the advertised completion date. Such apparent success could be due to either exceptional procurement performance motivated by incentive payments, or very generous time allowances (objectives).

Evaluating contractor/professional performance

Problems with the goal attainment approach for assessing overall project performance are even more pronounced when the same approach is used to assess the performance of individual parties to the contract. An associated difficulty is separating out the contribution of any one particular party. To whom, if anyone, is a failure to achieve a given objective, such as a completion date, attributable? Moreover, measuring the relevant outputs from a particular professional or contractor may be difficult, especially where a service, as opposed to a physical result, is involved.

A worrying aspect from the perspective of contractors and professionals is client assessment of the reasonableness of the level of profit earned by contractors and professionals. Where this assessment is based on hindsight, there is some likelihood that clients will regard monies paid to contractors to shoulder 'risks that never materialized' as

excessive profit. At the very least, risk premiums are likely to be revalued downwards with hindsight, unless significant risks have been realized, when contractor losses may be viewed as appropriate given the risk premium charged. However misguided, such assessments can have an adverse impact on contractors and professionals in respect of future earnings.

Reve and Levitt (1984) suggest that a client's ability to evaluate professional performance is often dependent on the client's technical familiarity with the professional services rendered. As a result, qualitative aspects of the relationship between the client and professional are often taken as a proxy for the evaluation of technical and economic performance, in much the same way as the skill and expertise of a well-liked physician might be judged by his or her bedside manner.

During the procurement process, each party in the project coalition is primarily concerned not with the effectiveness of the procurement process *per se*, but with ensuring effectiveness of its own organization. In this behaviour organizations seem to be adopting an approach to their own effectiveness, which Yuchtman and Seashore (1967) call the 'system resource' approach. This approach defines organizational effectiveness in terms of the degree to which an organization is successful in acquiring and utilizing scarce and valued resources to meet its needs. In terms of processes, this perspective focuses on the ability of an organization to exploit its environment. This implies that an organization will be most effective when it maximizes its bargaining position, and optimizes resource procurement by avoiding depletion of its resources or the stimulation of countervailing forces within the environment (Yuchtman and Seashore, 1967). Thus, a contractor may seek claims or additional time, but must be careful to avoid what the client or other parties regard as excessive claims, lest a backlash of tighter controls and counter-claims occurs. Such concerns apply to all members of the project coalition, including the client.

The need to manage acquisition of resources suggests a further, more political view of organizational effectiveness: an effective organization is one that is able to fashion accounts of itself and its activities in ways which other parties find acceptable (Gaertner and Ramnarayan, 1983). With this perspective, effectiveness is a characteristic of relations not outputs. It is negotiated rather than produced. Those subject to controls in the procurement process, such as professionals and contractors, direct their efforts to looking good along conspicuous performance parameters (Levitt and Logcher, 1976). Thus progress data are manipulated to such an extent that delays and cost over-runs often come as surprises to the client in the final stages of project work. Typically, what is reported during the project is that 'nothing unusual is happening' and that everything is in accordance with plans (Kreiner, cited in Reve and Levitt, 1984).

It is important to recognize that contractors and professionals, like all other market-oriented organizations, will attempt to manage their image, and the image portrayed to a client need not correspond to reality. Those features of their organization and performance which are visible to clients will receive attention with respect to image management, those aspects which are not visible to clients will be ignored.

Evaluating procurement methods

Attempting to evaluate and compare procurement methods on the basis of goal attainment is also likely to be problematic and potentially misleading.

As a first step in attempting to compare the efficacy of different procurement methods, it is

obviously important to be clear what is being compared with what. As one legal adviser remarked: 'clients debating whether or not to embark on a management contract may be influenced by their own or others' experience of what was termed a management contract but which was in fact something totally different' (Curtis, 1989). The introduction of the JCT 87 standard conditions will obviously help reduce confusion, but to the extent that variations are employed, the problem will remain.

A further important requirement for comparison is that apart from the procurement methods being compared, everything else should be equal – like must be compared with like. For example, in order to make a direct comparison between management contracting and its own more conventional form of contract, the Property Services Agency used both forms of contract on prison building projects, where two identical designs were constructed at the same time. The prison built using a management contract was completed 15% earlier, was 33% more costly but considered to be of better workmanship (Curtis, 1989). The problem with comparisons of this kind is that other things are never equal. In this case, the designs and perhaps even client objectives were identical, but what of environmental factors, works contractors and other personnel involved on the projects? A serious difficulty in making valid comparisons between procurement methods is the need to distinguish between effects on the procurement process and final outcomes which are due to the procurement method, and those which are due to other factors.

It follows that opinions and expectations of procurement methods based solely on assessing project performance at project completion are misconceived. That such perceptions may be erroneous is even more likely when the practical difficulties of assessing project performance and the influence of individual contributing contractors and professionals are taken into account. In particular, studies which try to draw conclusions about the efficacy of different procurement methods via statistics about project costs and time are bound to be inconclusive.

For example, in an attempt to evaluate management contracting, Sidwell (1983) compared 10 major management contracts with 32 other projects on construction cost and time. His data suggested that the management contracts were started very quickly compared with the other projects, although construction times for the management contracts were only sometimes shorter than times for the other projects. Three of the management contracts that took longer to construct than many of the other projects appeared to cost significantly more. Such results are interesting, but need to be interpreted with extreme caution. Variations in the type of project and differing cost–time trade-off decisions are just two factors which make it impossible to draw firm conclusions, even if the data show clear patterns.

As another example, consider a statement like 'management contracting costs more than other forms of procurement'. Such a statement is difficult if not impossible to prove. A fundamental difficulty is that we cannot tell what would have happened on a given project if a different procurement method had been used. In the case of management contracting, there are indeed factors which might be expected to increase project costs, but there are also factors that are likely to reduce costs. Even if attention is focused on specific additional costs, attributing cause may be difficult. As one management contractor pointed out: how does the client know if extra costs are due to the inefficiencies of the professional team or the management contractor or other causes? (Curtis, 1989). For example, sometimes it is necessary for the management contractor to ask works contractors to accelerate their work. The works contractors naturally want extra money, but the client objects to paying as he thinks that the extra costs have arisen due to the inefficiency of his professional team or their

contractors. Thus clients have been known to suspend paying fees to their architects when requests for extra money for site works have been submitted (Curtis, 1989). Similarly, increasing construction costs may be caused by scarcity and market trends rather than caused by the use of a particular procurement method *per se*.

Conclusion

This paper has considered the fundamental role played by client objectives in the procurement process. At the simplest level, objectives are needed so that appropriate courses of action can be taken for their attainment. Performance criteria that clients might consider are cost, time and quality. In addition, clients are likely to be concerned about expending resources unproductively in the procurement process, flexibility to incorporate changes, and uncertainty about all of the foregoing concerns.

Setting finely judged, challenging but achievable objectives that encourage contractors and professionals to employ their 'best endeavours' is difficult. Part of the problem is the existence of project-related uncertainty and the interdependencies between objectives. Bearing this in mind, it is important for clients to:

1. Set clear objectives.
2. Subject objectives initially set to careful trade-off analysis.
3. Consider objectives carefully when choosing a procurement method.
4. Communicate objectives clearly to other involved parties and avoid conflicting guidance to different parties.
5. Ensure that reaction to unexpected events involves proper revision and consideration of client objectives.

A further shortcoming of assessing effectiveness in terms of goal attainment is that this does not focus attention on identification of shortcomings and strengths in the procurement process. If the concern is with understanding or seeking to improve effectiveness, then organizations need to be able to specify not just the tasks or objectives they are trying to accomplish, but also the *processes* that are involved in accomplishing them.

Concern with understanding and improving the processes involved in organizational effectiveness has led to the distinguishing of a number of useful perspectives on effectiveness in the organization literature. One particularly helpful perspective for present purposes is the system needs approach. Regarding the procurement process as the relevant system (as opposed to focusing on a single party to the process), then the following generic system needs should be addressed (Georgopoulos, 1973):

1. *Adaptation*: an ability to adapt favourably to environmental changes.
2. *Allocation*: an ability to deploy and allocate resources in the most appropriate manner.
3. *Co-ordination*: of energies and efforts to the solution of the system's problems and objectives.
4. *Integration*: of individual members to develop common organizational values and share norms.
5. *Tension management*: an ability to minimize and resolve tensions and conflicts.

6. *Productivity*: an ability to reach and maintain high levels of output, implying an ability to maximize efficient and reliable performance.
7. *Integrity*: an ability to preserve identity and integrity as a distinct problem-solving system regardless of changes constantly occurring inside and outside the system.

This generic list of needs provides a useful, comprehensive agenda for those seeking to improve the effectiveness of construction procurement processes. Given a procurement process that involves a temporary coalition of individuals from different organizations with potentially conflicting objectives, many of these agenda items are problematic. They do, however, suggest areas for more detailed consideration.

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