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Analysis of conflict and change in construction projects

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Conflict and change can have considerable impact on the success or otherwise of construction projects. Examples of conflict and project change have been collected in structured interviews within a series of organizations which are clients of construction activities. A methodology which uses a process of hierarchical decomposition has been developed for classifying this data and rendering it suitable for subsequent analysis. The results presented in the paper are of a preliminary investigation and lend weight to the hypothesis that the creative management of conflict and change can benefit construction industry clients.

Keywords: Conflict, change, client, project management, strategy.

Introduction

Management research in the construction industry has tended to focus on topics such as industry performance, site productivity, contractual procedure, organization design, computers in construction, and more recently the application of expert systems, and quality systems. The role of conflict and change in construction has received scant attention (with the exception of the very specific field of contract litigation) yet in all organizations there are individuals and groups competing for influence or resources, there are differences of opinion and values, and conflicts of priorities and goals (Handy, 1983). It is noted that although the term 'conflict' is frequently used in the context of a single firm, many of the associated concepts and ideas are directly transferable to construction project environments which have, in turn, been described as temporary multi-organizations (Cherns and Bryant, 1984).

The importance of conflict and change in construction projects should not be understated; Handy affirms that '. . . the resolution of differences or potential differences takes up the largest single chunk of managerial time and energy, and is not always well done at the end of it all'. Research in construction management has so far failed to address the subject head on, although it has been an important sub-theme for many years. For example, the socio-technical work carried out by the Tavistock Institute of Human Relations which focused attention on the relationship between the social, technical and administrative functions in construction organizations and brought to light some examples of conflict in the industry (Higgin and Jessop, 1965; Crichton, 1966). The Construction Management Unit of Brunel University (now transferred to Bath University) have reported on the extent to which personality differences between architects and construction managers can lead to or away from conflict. It has also been proposed (Cherns and Bryant, 1984) that many of the

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problems concerning design changes, delays and difficulties during the construction phase have their origins in unresolved conflicts within the client organization which remained unresolved when the decision to build was taken, and are exacerbated by too early an insistence on an oversimplified client representative function.

An understanding about conflict and change in construction projects is more important now than ever before given the differentiation that exists in today's project organizations in which the integration and co-ordination of the different groups within a project can be difficult. It is important to recognize that, to some extent, conflict between groups in organizations is inevitable (Bowditch and Buono, 1990) and that there is a need to acknowledge and plan ahead for project conflicts; to admit openly that change, for whatever reason, is always likely and to control it honestly (Cornick, 1990). Armed with an understanding of project conflict and change it should be possible to reduce the occurrence and limit the damage caused by dysfunctional conflict and at the same time provide conditions which encourage 'controlled' functional conflict and change of benefit to the client. Conflict can be constructive or destructive; and neither the occurrence nor the outcomes of conflict are completely and rigidly determined by objective circumstances. The course of conflict is open to influence even under the most unfavourable objective circumstances (Deutsch, 1969).

A preliminary investigation has been carried out involving a broad literature search and the collection of information provided by six clients of the construction industry. A number of construction companies have also been consulted. The aims of the preliminary investigation are to establish a rigorous methodology for classifying and analysing the conditions for, and effect of, conflict during a construction project, to identify for a broad range of construction projects typical locations where conflict and change occur, and to determine whether or not an understanding of conflict processes contributes to the formulation of project management strategy. In order to reflect the wide scope and application of this research conflict and change are examined in the following four contexts: construction process, project organization, project quality and control systems, and contractual procedures.

The nature of conflict and change

For the purpose of this paper conflict is defined as

> any divergence of interests, objectives or priorities between individuals, groups, or organisations; or nonconformance to requirements of a task, activity or process,

and change as

> any alteration (by modification, omission, or addition) to a project document, design, process, or method previously approved or accepted.

Handy (1983) suggests five different situations in which conflict can arise. These are listed below together with examples in construction:

1. Formal objectives overlap. For example, a consulting engineer may have as one of his objectives the long term safety and stability of a bridge or building. Whilst these are also

important to a construction firm, the firm is primarily concerned with cost and profit margins. The engineer who requests unplanned changes at various stages of the project to keep safety tolerances high, perhaps responding to new information, can meet with resistance from the main contractor and/or subcontractors in line with their objectives.
2. Role definitions overlap leading to conflicting objectives. For example, in the installation of building services a conflict may arise over who has responsibility for quality assurance. The site agent working for the main contractor may regard it as the clerk of work's responsibility, who may in turn regard it as the site agent's, insisting that his own role is not to 'inspect in' quality but rather to verify quality has been achieved.
3. The contractual relationship is unclear. For instance, is the allegiance of the clerk of works to the client or the design leader, or is he the servant of the site manager?
4. Roles are simultaneous. An organization or an individual may provide both services and co-ordination. This is typical of the architect's dual role as lead designer and project manager. It may not always be clear to other participants which is the current role.
5. There are hidden objectives. The architect may be looking towards future design awards, rather than only the client's needs; or the main contractor may put in an unrealistically low bid to secure a contract during a period of very poor business.

Although there has been little research carried out in the area of project change, the general subject of conflict has received significant attention, for example: Corwin (1969), Deutsch (1969), Pondy (1969), and Walton and Dutton (1969). Handy (1983) describes conflict as one of three manifestations of difference in organizations, the other two being argument and competition. A certain level of conflict in an organization is not only inevitable but desirable, for conflict is both a cause and effect of change (McGivering, 1983). It has also been reported (Pondy, 1967) that an organization's success hinges to a great extent on its ability to set up and operate appropriate mechanisms for dealing with a variety of conflict phenomena or sequence of interlocking conflict episodes such as those described below (see also Bowditch and Buono, 1990).

Latent conflict

Latent conflict refers to the source of a conflict. The assumption is that due to certain antecedent conditions conflict 'should' occur. There are three basic types of latent conflict and more than one may be present simultaneously: (i) the bargaining model or interest group conflict which is concerned with interest groups in competition for scarce resources; (ii) the bureaucratic model or authority-structure conflict, appropriate for the analysis of conflicts along the vertical dimension of a hierarchy and essentially about problems of control such as when one party either seeks to exercise control over some activity that another party regards as his own province or seeks to insulate itself from such control; and, (iii) the systems model of conflict which is concerned with lateral conflicts or conflicts among persons at the same hierarchical level, and is essentially about problems of co-ordination, such as when two parties who must co-operate on some joint activity are unable to reach a consensus on concerted action.

Perceived conflict

Perceived conflict generally follows on from latent conflict; the cognitive state of at least some

of the members of an organization begins to perceive or become aware of a conflictful situation but neither party is upset about it. In some cases latent conflict may exist in a relationship without any of the participants perceiving. There are two important mechanisms that limit perception of conflict: the suppression mechanism (personal) and the attention-focus mechanism (organizations). Individuals faced with conflicts that are only mildly threatening tend to deal with these by blocking their awareness of them. This is quite likely to happen in construction projects since the project organization (and therefore the conflict) is temporary in nature. Organizations are characteristically faced with more conflicts than can be dealt with given available time and capacities. The normal reaction is to focus attention on only a few of these which tend to be the conflicts for which routine solutions are available. For instance, rules governing conflicts involving ownership of risk, delay, and additional cost are often laid down in conditions of contract, although disputes do still arise. For organizations successfully to confront the less programmed conflicts, it is frequently necessary to set up separate subunits specifically to deal with them. Additionally, conflicts may sometimes be perceived when there are no conditions of latent conflict. This can be explained by the 'semantic model' in which conflict is said to result from the parties' misunderstanding of each others' true position. It is argued that such conflict can be resolved by improving communications between the parties. However, if the parties' true positions *are* in opposition, then more open communications may only exacerbate this kind of conflict.

Felt conflict

Perceived conflict which grieves the parties involved, but which neither would normally do anything about is called felt conflict. Stress and tension are usual outcomes of felt conflict. There is an important distinction between perceiving conflict and *feeling* conflict, i.e. the affective state of the individuals involved at which point they begin to suffer stress, tension, hostility, anxiety, etc. as a result of a conflictful situation. For instance, A may be aware that A and B are in serious disagreement over some policy, but it may not make A tense or anxious, and it may have no effect whatsoever on A's affection towards B. In an organization anxieties may result from inconsistent demands from the organization, identity crises, or from extra-organizational pressures. Individuals need to vent these anxieties in order to maintain internal equilibrium. This gives rise to the so-called 'tension model'. Thus, felt conflict may arise from sources independent of the three types of latent conflict. On the other hand, latent conflicts may provide appropriate targets for undirected tensions.

Manifest conflict

Manifest conflict involves openly aggressive behaviours ranging from mild passive resistance through sabotage to actual physical conflict. It is that behaviour which, in the mind of the actor, frustrates the goals of at least some of the other participants. In other words, a member of the organization is said to engage in conflictful behaviour if he consciously blocks another member's goal achievement. He may engage in such behaviour *deliberately* to frustrate another, or he may do so in spite of the fact that he frustrates another. The following question becomes important: 'Under what conditions will a party to a relationship *knowingly* frustrate another party to the relationship?' Suppose A unknowingly blocks B's goals. This is not conflictful behaviour. But suppose B informs A that he perceives A's behaviour to be conflictful; if then A acknowledges the message and persists in the behaviour it is an instance

of manifest conflict. If a conflict is strategic in the pursuit of subunit goals, then manifest conflict is likely. In a construction project any of the participants can initiate conflict if they allow their own organization's goals and priorities to take precedence over those of the project. Once conflict breaks out on some specific issue, it frequently widens and the initial specific conflict precipitates more general and more personal conflicts which had previously been suppressed in the interests of preserving stability in a relationship. Each episode or encounter leaves an aftermath that affects the course of succeeding episodes.

Conflict aftermath

Conflict aftermath is the response to, and outcome of, conflict and may involve change. There may be no 'active' response but there will be an outcome, even if it is sustained chronic conflict (continuous, high-level conflict). If a conflict is actually resolved this can lead to greater satisfaction among the participants; if a conflict is not resolved then what appears to be a satisfactory resolution may only be a reversion to one of the prior levels of conflict. In response to conflict the members of an organization can: (a) withdraw from the organization; (b) alter the existing set of relationships; or (c) change their values and behaviour within the context of existing relationships. The interface between perceived conflict and manifest conflict and the interface between felt conflict and manifest conflict are the pressure points where most conflict resolution programmes are applied. The object of such programmes is to prevent conflicts which have gone beyond the latent stage and reached the level of awareness or affect (i.e. feeling) from erupting into nonco-operative behaviour. The availability of appropriate and effective administrative devices is a major factor in determining whether conflict becomes manifest. Mechanisms for resolving lateral conflicts among the parties to a functional relationship are relatively undeveloped (Pondy, 1967) yet these are probably the most common sources of organizational conflict in construction projects. In the case of a disruptive or potentially disruptive conflict, control and regulation is often the best short-term solution. However, regulation in this sense recognizes and legitimizes the conflict and therefore may perpetuate it. Control can sometimes take the form of a 'buffer' put in to diffuse damaging peaks from felt and manifest conflict. For instance, giving sole responsibility to a person to act as a single point of contact for the client may limit the damange caused by a difficult user-architect relationship, without losing the potential for valuable project input from the user concerned.

The nature of construction

Construction process

Construction is a process in that it has a start point and an end point, and there is input and transformation of resources between the two. Project management serves to manage this process, or rather to manage the sum of all the subprocesses that together constitute the construction project. It is convenient when considering project execution to divide the process into its component subprocesses, partly because the nature of the individual subprocesses varies so significantly, but also because in practice it is common to assign particular project personnel or groups responsibility for individual subprocesses. Figure 1 shows a typical (simplified) model of the construction process in diagrammatic form.

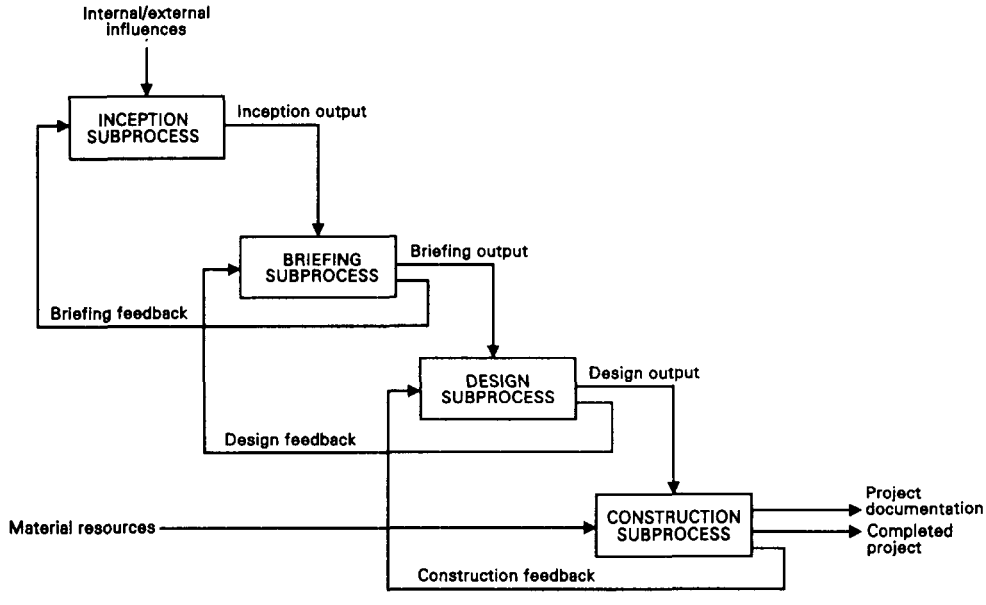


Fig. 1. Simplified model of the construction process.

Any process which involves a multitude of activities, some occurring serially, others in parallel, provides ample opportunity for conflict to arise. Conflicts can occur within single processes or subprocesses, such as design or site investigation, or between processes, such as marketing and design (important for developers), or design and construction. Change takes place to remedy conflict. The nature of the change will depend upon the severity, in cost and time terms, of the conflict. Usually, the longer it takes to discover a conflict in a process, the greater the cost of the remedy. Conflict in the context of the construction process is similar to the concept of nonconformity in quality terms. Oliver (1990) has interpreted BS 5750, Part 1 Clause 4.13 *Control of nonconforming product* as covering (in design) faulty calculations, inaccurate drawings, incomplete specifications, etc., and (in construction) inaccurate foundation material, inaccurate shuttering for concrete, incorrect positioning of holding-down bolts, nonconforming cement, steel reinforcement, etc. Design control procedures should ensure that nonconforming design work is recognized and changed before it is utilized. Change in this sense includes the 'do nothing' solution which is not to ignore a conflict, but to recognize its presence and approve 'doing nothing' as the best course of action under the circumstances. The key points are: (i) early recognition of conflict within and between processes; and (ii) the mechanism to enact a rapid and appropriate response.

Project organization

Models of project organizations attempt to show relationships between people and/or groups involved in construction projects. They differ in the way they deal with time and contractual obligations. Some of them try to capture the changing state of a project organization with time, others cram together all the relationships during a project into a single diagram.

Relationships vary depending upon the mode of procurement; many models depict a particular style or method of procurement. This is typified by the Chartered Institute of Building (1982) models which represent in turn the traditional method of construction, design and construct, management contracting, nonexecutive and executive project management. Walker (1988) describes a variety of different forms of project organization that can be established. He identifies two types of client: (i) no construction expertise, and (ii) in-house expertise available; three types of design team: (i) conventional organization, (ii) nonexecutive project management, and (iii) executive project management; and seven methods of appointing a contractor: (i) selective competitive tender, (ii) two-stage competitive tender, (iii) competitive serial tender, (iv) negotiated tender, (v) management contract, (vi) separate trade contracts, and (vii) design and build; giving a total of 42 possible combinations.

However, the above models still only represent a subset of the project organizations which may be found. This is because they are pitched at a fairly low organizational level and therefore cannot take into account all of the available permutations. An alternative is to use a model based on a higher organizational level. Such a model, proposed as a result of the present research, focuses on the relationships between the separate component organizations as defined below.

Client system (CS). This term includes all the organizations which satisfy one or more of the following criteria: (i) has the authority to approve expenditure on the project; (ii) has the authority to approve the form the project has to take and/or its timing; (iii) will be the owner of the project; (iv) will be a major tenant or user; (v) will administer or manage the project upon completion (Walker, 1988).

Project organization (PO). The temporary multi-organization established for the limited and finite purpose of bringing the project into being from inception to completion, and which consists of parts of several separate and diverse organizations (including the client system), and whose members will eventually disperse, going back to their own organizations or on to some new project (Cherns and Bryant, 1984).

Client project organization (CPO). The intersection of project organization and client system; that part of the client system designated or assumed as having project responsibility.

Project management (PM). A subset of the PO whose responsibility includes one or more of the following management functions: boundary control, monitoring and maintenance activities (in connection with the activities of the project organization), project recommendation and/or approval powers (Walker, 1988).

Examples of how these organizations relate to one another are given in Fig. 2. Figure 2a is typical of the majority of projects. The role of project management is shared between the client and the project organization. In Fig. 2b the project management function is contained entirely within the client organization, e.g. the property developer, English Estates. The situation in Fig. 2c is less usual; the entire project organization is a subset of the client organization, for instance the house development arm of a construction firm.

The potential for conflict is always present in construction projects. Generally, organizational conflicts may originate in one person, or in one group in which case they are called *intra*personal, or *intra*group conflicts. Or they may reflect incompatible actions of two

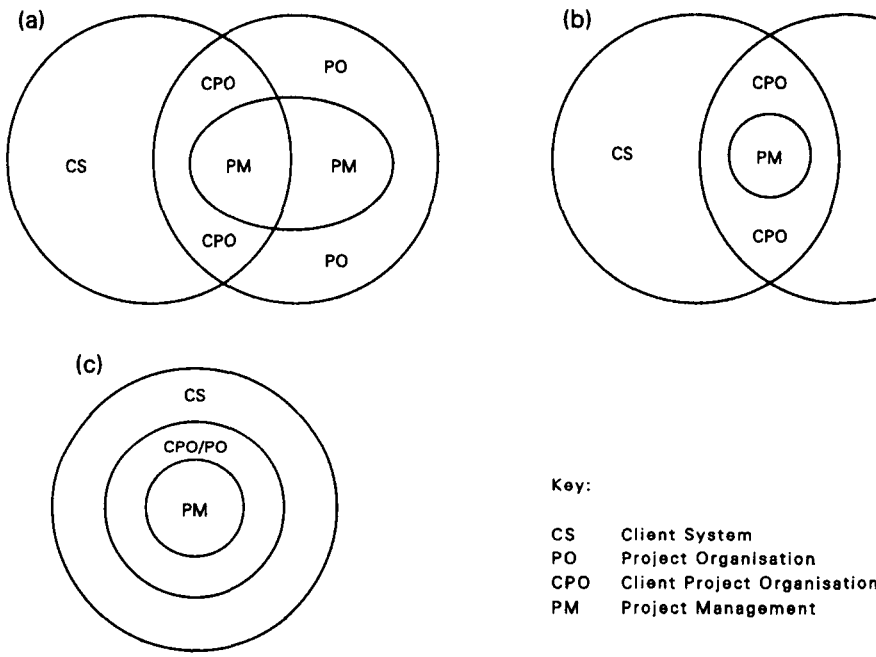


Fig. 2. Organizational models.

or more persons, or groups in which case they are called *inter*personal, or *inter*group. The characteristics and culture of a project organization are important in determining: (i) the relative frequency of conflicts; (ii) the ability of an organization to resolve conflicts; (iii) the likelihood of achieving a productive or dysfunctional outcome.

Project quality and control system

Quality assurance is currently a very fashionable term in the construction industry. It is now possible for clients to use only BS 5750 third party assessed and registered firms during all stages of a construction project, and the choice of such firms is increasing all the time. Clients of large projects can have individual project sites assessed and registered for the duration of the project. Quality management consultancies are available to advise and serve the client (not without cost, of course).

Quality is often defined as conformance to requirements. In this sense a quality management system provides a method of working which constantly checks the validity of each operation or activity against identified requirements, highlighting modifications and changes that need to be carried out to continue meeting and to meet more closely those requirements. The presence of a quality management system (QMS) in an organization can help to secure the benefits of conflict for the client and also control and regulate organizational and process changes; document change control is a major part of quality management systems. As a client turns its attention to the introduction of a QMS, some of

the issues surrounding conflict and change are brought to light and dealt with. This has been the case with ICI Engineering: 'One result of introducing BS 5750 is that project control has had to be applied in cases where before it was very much up to the project manager; project control has been given a higher profile'.

Construction projects involve a number of organizations, disciplines, skills and people of widely ranging experience and background. This leads to communication problems. For instance consider the subprocess of design. A design programme should clarify what the client should provide by way of definition, and what other contributions he can make to the design process. Similarly, for the designer, clarification of the role of the client can save misunderstanding and possibly time. It can also be helpful to know that the client is aware of the constraints (e.g. statutory and regulatory) within which the designer has to work (Construction Industry Research and Information Association, 1985). Unfortunately, many clients, particularly those who only rarely enter the construction market, find it difficult to articulate their requirements in a form which enables the designer to devise an optimum solution. As a result misunderstandings occur which can have a damaging influence on the quality of the project and which cannot be corrected or compensated for at a later stage (Ashford, 1989).

Figure 1 shows the main subprocesses in a project. Each subprocess (itself normally involving two or more participants) and the interfaces between them need to be managed and controlled. The project organization exists only for a short time, although the contributing organizations exist from project to project. However, it is unrealistic to expect a quality management system to embody more than one organization because of administration difficulties, conflicting objectives, and differing organizational structures. Nevertheless, in the event of each of the contributors of a construction project operating their own quality management system, part of each of these separate quality systems would inevitably overlap across similar subprocesses and across functional interfaces. Figure 3 illustrates the main subprocesses in a project in the form of a project quality model and Fig. 4 shows the overlap required by the individual contributors' quality management systems, including the contribution, if any, required by the client. This concept has been represented to some extent in practice by bringing together the 'quality plan' of each participant of a particular project; sometimes collectively referred to as a 'project quality plan' (Cornick, 1990). Most quality systems include periodic quality audits to review and analyse existing procedures. Applied to the formulation of project management strategy, this process would benefit project managers in situations involving conflict and/or change.

Contractual procedures

Since most clients are generally interested in acquiring only a specific type of constructed facility, they should be aware of the common industrial practices and contractual arrangements suitable to the types of construction pertinent to them. Some clients require periodic acquisition of new facilities and/or rehabilitation of existing facilities. Others procure a constructed facility only once in a long while and may not be so conversant with the various contractual alternatives (Hendrickson and Au, 1989). One client project manager interviewed stated that, 'there are something like 137 different standard conditions of contract; it is difficult for a client to keep up with the advantages and disadvantages of each one'.

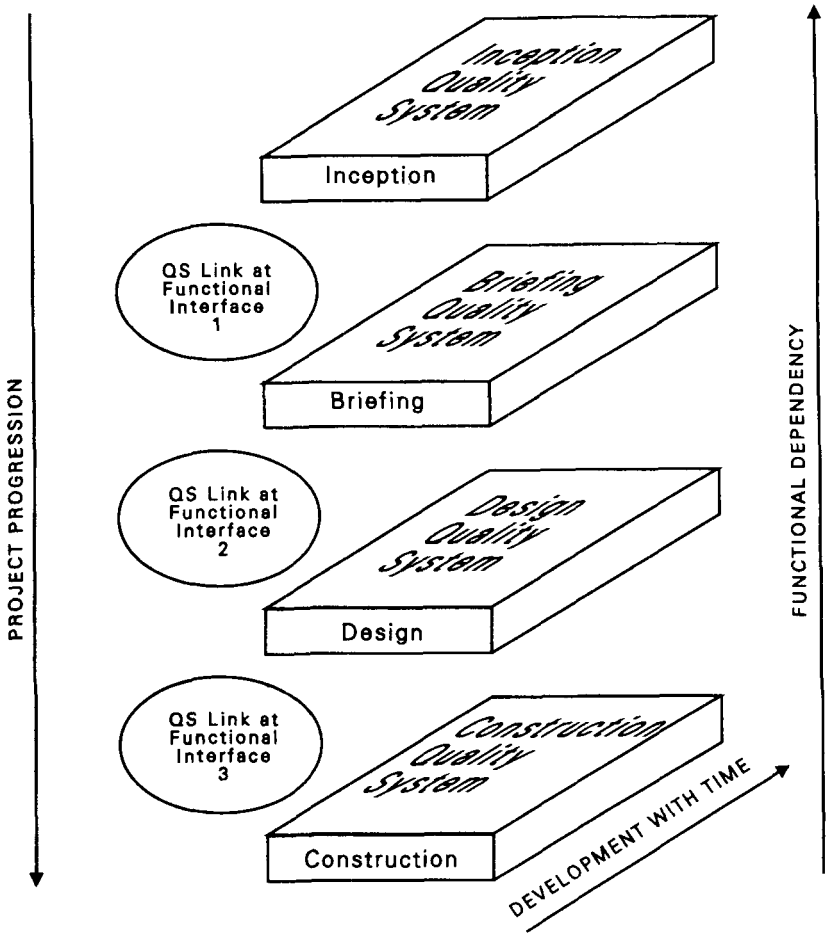
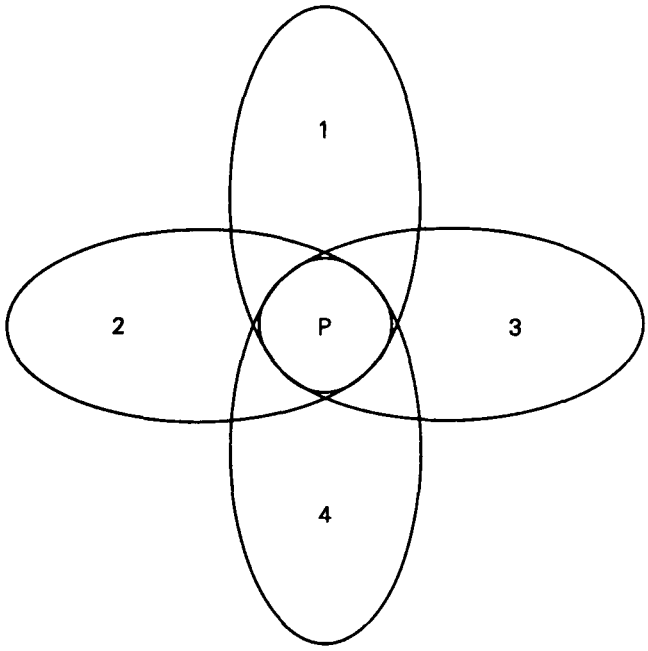


Fig. 3. Project quality model.

At Northumbrian Water Ltd., in common with other experienced clients, there is a set of contract condition modifications that always go out with invitations to tender. These amendments specify things which Northumbrian Water want included and the manner in which they would like them. The lay client is generally stuck with the standard conditions although the consulting engineer, or architect, may suggest a few amendments from his experience.

Contracts normally include procedures for resolving disputes and manifest conflict between the contracting parties. They rarely include detailed provisions or information regarding the prevention of conflict, nor are they applicable to situations relating to the internal affairs of the separate companies involved. There has been a substantial amount of work done on the selection of appropriate contracts to use (e.g. Skitmore and Marsden, 1988) and the procedure for construction contract claims (e.g. Kim and Adams, 1989). It is not the purpose of this paper to reiterate this, but to point out that certain types of conflict exist in this area.



1 Quality system of design firm
2 Quality system of main contractor
3 Quality system of subcontractors and suppliers
4 Quality system of client
P Overlap of 1-4 representing overall quality system for project

Fig. 4. Overlapping quality systems in a construction project.

Research methodology

A number of previous research workers have collected information from companies within the construction industry. For example, Cherns and Bryant (1984) approached potential clients formally and informally:

The formal method, sending a standard letter briefly explaining the project and following this up with a phone call to arrange an initial meeting, was far less productive than the informal method of using personal networks and previously established relationships with senior members of client organisations. While little information came from formal approaches, the informal ones netted an interestingly assorted bag of people willing to talk to us.

Fisher (1984) performed a series of interviews involving four construction companies:

Structured interviews were prepared (Garrett, 1970) with suitable meeting agenda circulated to the staff to be interviewed before the interviews were commenced. An initial interview was conducted with a senior director and also the person nominated by the company as a link person.

Bresnen and Haslam (1991) used a target sample of 179 construction industry clients for their

survey. They generated a sample of client organizations using listings from the 'Building/refurbishment' and 'Housing' subsections of the 'Awards' section of the *Contract Journal*:

> Once cases were selected, a telephone call was made to ascertain who would be best able to act as key informant about the organisation and the specific project. This individual was then sent a letter outlining the research and this was followed up by a telephone call to establish willingness to participate. Once access had been agreed, an interview was arranged and a short pre-interview questionnaire was dispatched to obtain some general information. The interviews were then based on a 40-page structured questionnaire and lasted an average of 1–1.75 hours.

In the present work a procedure was followed which built on the information gathering techniques of previous investigators and added to this a new method of data processing and reduction. The procedure is described below:

1. Establish contact with a potential interviewee by phone to discuss briefly the purpose of the interview and set up a meeting. Confirm in writing. It was occasionally necessary to send a summary of the project before a meeting could be arranged.
2. Visit company to carry out interview. This could take a morning, an afternoon or sometimes all day depending upon the location of the company. However, the actual duration of an interview was normally between 1–2 h. Unstructured interviews began with an exchange of pleasantries, a brief summary of the purpose of the visit and the objectives of the research, then a long discourse from the interviewee, with occasional interjections from the interviewer if the subject began to veer too far off course. More structured interviews followed a similar line, however, in these cases a set of written questions was at hand which the interviewer referred to and could read out when necessary.
3. Transcribe interview material. This usually took between 1–3 days depending upon the length of the interview and the spoken style of the interviewee. For instance, interviews which largely comprised of short complete sentences were easily transcribed. However, long rambling comments with many side-tracking subclauses, took far longer. It was important to retain the intended sense of respondents during transcription. Spoken English does not always convey the same meaning in the written form, a fact which had to be taken into account later when quoting directly from transcripts (see also Riley, 1990). Direct word-for-word transcription was quicker in the short term, however, subsequent processing did take longer, if only because a significant proportion of the interview material was sometimes unsuitable or irrelevant. It was often possible to edit out less useful information during transcriptions; this saved on processing time later, but produced incomplete transcriptions.
4. Processing. The reduction of textual information derived from interviews was performed using software developed on a combined word processing and project processing package. This enabled items of data to be quickly earmarked, extracted and encoded for general comparisons and statistical analysis. Data items were marked within transcripts by enclosure between two star (*) symbols. A program was developed using the SmartWare† project processing language to extract these from the transcript and store

† Registered trademark of Innovative Software Inc.

them in a separate file. Each item of data was assigned seven attributes to be employed later as a basis for comparison and analysis. The attributes used were: (1) reference code, including company name, transcript filename, and the page and paragraph where the information occurred, (2) subject (from conflict, and change), (3) context (from process output, organization, quality and control systems, and contracts), (4) parties involved (from CS, PO, CPO, and PM), (5) subprocess (from inception, briefing, design, and construction), (6) project name, where applicable, and (7) comment. Attributes 2, 3, 4 and 5 could be given more than one descriptor. For instance, an item may be classified by subject as belonging to the set of data items containing both conflict and change. The data were stored in a single file and could be queried using a second programme. For example, all data items with the attributes 'subject = change', 'context = process output', and 'subprocess = design or construction' could be quickly accessed, stored as a separate file, and analysed.

The collection and reduction of the data formed a five tiered hierarchy consisting of: (i) raw data – tapes of recorded interviews, documentation, letters, etc.; (ii) transcribed interviews; (iii) primary level processing – collation and sorting of all contributions relating to conflicts within a single project as (a) general information and personnel, (b) individual conflict episodes; (iv) secondary level processing – cross checking of information, reduction into summary form, and critical analysis of conflicts; and (v) tertiary level processing – assignment of attributes and statistical analyses.

Conflict and change in construction project environments

Client attitude and philosophy

It is common for clients to differentiate between design changes and scope changes. A scope change is a fundamental change to the intent of a project. In ICI Engineering a project begins with a particular business intent which is turned into an engineering intent. When the client wishes to make a change, for example if there has been a fundamental misunderstanding about what was required, or new information makes the original assumptions invalid, this is regarded as a scope change. A design change, however, does not alter the intent of the project. Design changes are often provided for by way of contingencies included in the project scope. Consider, for example, a decision about whether to use one pump or two in an installation. The client may not have had sufficient information at the time the original project scope was produced to make a final decision. Nevertheless, an informed choice was needed. If it turned out later that the wrong choice had been made, a design change would be required. Of course, not all design changes can be anticipated in this way.

Change is viewed differently depending upon the type of environment in which construction occurs. For example, in ICI change is regarded as an acceptable part of project management and control. The volatility of the market place demands that change must be allowed for in order that the technical quality of the end product reflects the market. Project design needs to be responsive to changes in technology; the accommodation of change is regarded as vital in project execution terms. Other clients, such as the University of Durham (U of D), avoid change so far as it is possible but nevertheless acknowledge that it is inevitable to some extent in many projects. Users within the University, on the other hand, prefer to regard the ability to effect change as a normal and acceptable facility regardless of the stage of

a project. Explanations concerning the difficulty of making changes given to users seem to provide some of them with the impression that the client project manager and the architect are obstructive.

In organizational terms there can be significant planned change during the life of a project both with respect to the nature of the relationships between, and the responsibilities of, the parties concerned. For the regular or sophisticated client organizational change also evolves from project to project; documented project procedures (Gardiner, 1991) are updated from time to time to incorporate new knowledge and experience. For example, in the U of D there is now no Estates and Buildings Committee. Instead, the Director of the Estates and Buildings Department has been given executive authority and will only refer major decisions to the Resources Committee. In general, senior officers sitting on committees and subcommittees are being given executive powers. The aim is to streamline the decision making process. To date the new system is largely successful but any committee executive can slow down the process by insisting on taking decisions through the full committee procedure as before.

While client organizations recognize the inevitability of change and have plans to accommodate that, conflict is not considered and is frequently seen as a negative phenomenon. It is associated with increased cost and programme delay; claims and counterclaims. Despite this, upon questioning, most client project managers recognized the value of challenging existing norms and expectations.

Analysis of conflict and change data

One hundred and thirty data entries were collected from 16 recorded interviews across six client organizations. A wide range of types of conflict and situations involving change have been identified. Figure 5 shows the distribution of conflict and change across the project contexts: process output, organization, quality and control, and contracts. The context having the greatest number of conflicts is *organization* (42 occurrences) of which 11 also include change. This is closely followed by *quality and control* (39 occurrences of conflict), the only context having more occurrences of change than conflict. *Contracts* has the fewest number of data, a total of only 12 entries, compared to 68 for *quality and control*, 51 for *organization* and 22 for *process output*.

Figure 6 shows the distribution of conflict and change across the subprocesses of a construction project. Project design has the most occurrences of conflict and change, 53 and 47 respectively. There are 25 occurrenes of conflict in briefing and 30 in construction. Inception and tendering have only 7 and 10 respectively. It is noted that the preliminary investigation was primarily intended to develop research methodology and data handling techniques and therefore no attempt was made to eliminate the risk of these figures being biased by the individuals spoken to in the different organizations. This type of bias will be taken into account in a subsequent investigation.

Conflicts originating during inception, briefing or design, should be identified early in the life of a project because of the reverse order dependency of construction subprocesses (see Fig. 3). From the client's point of view, the success of construction depends to a large extent upon the success of the design, which depends upon the quality of the brief, which in turn depends upon the inception process and the reasons behind the decision to build. A latent conflict originating at inception, perhaps between the concept architect, a user representative and the client's projects officer, which leads to a change once the construction

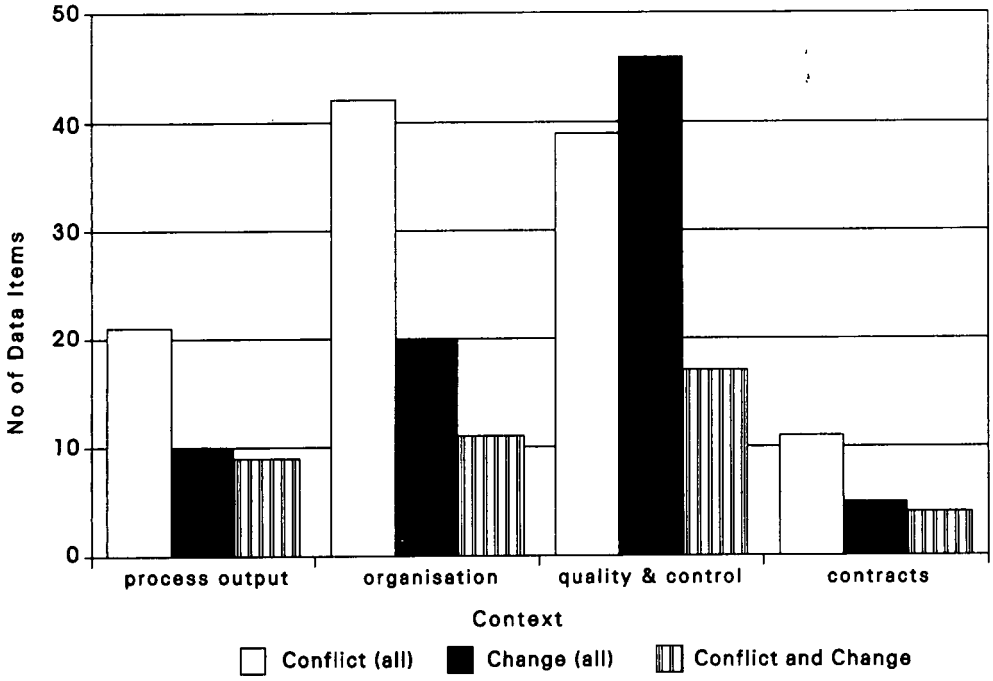


Fig. 5. Distribution of conflict and change across selected contexts.

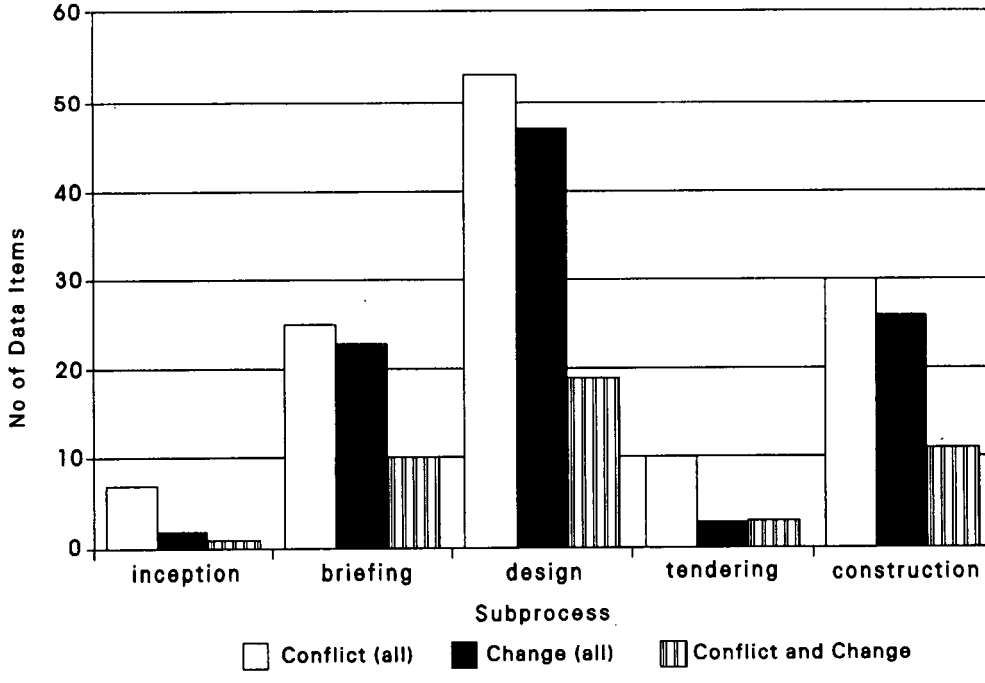


Fig. 6. Distribution of conflict and change across subprocesses.

subprocess is under way, is likely to have serious implications of cost and time. The table below shows the distribution of conflict and change for the subprocesses briefing, design, and construction, within the context of *process output*:

	Conflict	Change	Con. & Chg.
Briefing	2	1	1
Design	17	7	6
Construction	8	5	4

It can be seen that one of the conflicts which occurred during briefing led to a change. On the other hand, six of those for design and four of those for construction led to change. It is perhaps surprising that such a high proportion of conflicts leading to change should be in the construction phase, when the cost of change is probably at its highest. However, the preliminary investigation does not contain sufficient data to draw specific conclusions from this analysis. Nevertheless, it does suggest areas for further study.

Examples of conflict and change from client organizations

Many situations were identified in which conflict and/or change occurred. A selection of these are listed below:

Inception/briefing/tendering
Briefing procedure and co-ordination of information
Client and/or users lack experience
Getting a consensus view from users
User committees: low recognition and lack of authority

Design
Design error
Design omission
Design not meeting specification
Getting written approval from users
Interpretation of drawings by client

Construction/operation
Construction: failure to meet design
Site: quality of work
Cost overrun
Running late
Operational faults

Project management/other
Internal politics: planning and approval
Lack of internal agreement between users and client project manager
By-passing a 'single' point of contact
Conflict of loyalty (e.g. clerk of works)
Different levels of change control depending upon the nature of the change

Different emphasis on project changes as a project progresses
Maintaining interfaces to serve the client
Use/misuse of a quality system
Contract condition modifications

Committees were one type of situation in which conflict occurred. In ICI projects are headed by a steering group or committee; a typical committee comprising representatives from the works, the business, a project manager from engineering, and also a business engineering manager. The project manager is the link into the design team. Any problems get fed back to the steering group on a regular basis. The steering group has an overseeing role; it would decide if a scope change was needed. It provides an environment to help detect latent conflicts and which encourages the open expression of perceived and felt conflicts across interfacial boundaries. The process of conflict detection, expression and resolution within a controlled environment benefits the client. There are many technical interfaces at ICI Engineering and one of the roles of project control is to ensure that interfaces between ICI Engineering and the client (i.e. one of ICI's businesses) and between project control and the contractors, are serving the client. Well maintained interfaces behave as open channels and enable the client to locate and benefit from conflict between the various parties at the earliest opportunity. Conflict which originates during the inception, briefing, or early design subprocess, but which is not discovered until the final subprocesses of a project may still benefit the client, but with a significant cost and time penalty.

However, not all conflict in committees is beneficial. Consider, for example, the University of Durham in which, until recently there was a tendency to create project subcommittees (PSCs) to support a project during its design and construction subprocesses. The purpose of a PSC is to provide a balanced and representative client voice to interact with the lead designer and the client project manager, and to provide the right environment to enable perceived and felt conflict to be brought into the open and resolved (and in this respect the PSC is similar to the project steering group of ICI Engineering). Most projects proceed satisfactorily and are regarded as successful by users and University alike. However, in one particular project (a new academic building) this was not the outcome obtained. There was some difficulty integrating the 'non-constructionwise' user-members of the PSC into the early subprocesses of the project. The concept and importance of design information status was sometimes unclear. This led to intergroup conflict between some of the users and the project management team during the later subprocesses of the project.

In general, large or complex clients create project committees in order to develop a balanced brief and to bring to light and resolve potential conflicts at an early stage. The value to the client of a committee style environment depends upon having good integration within the committee. A poorly structured committee consisting of largely uninterested parties is unlikely to command authority or respect from the other members of the project organization.

Change also occurs in many different situations. What is important here is the control of change. A system which allowed anybody to change anything would be catastrophic. Similarly, a system which prevented the consideration of any changes could result in a building quite unsuitable for its client, or even the discontinuation of a project. Changes themselves are not usually a problem. Most problems arise when there is no suitable mechanism or system to recognize required changes and enable them to occur promptly with minimum disruption. The system should also help prevent unnecessary changes taking place

(without creating further conflict between the parties). One of the problems encountered by the users in the PSC mentioned earlier was a resistance to change, even though questions regarding the same changes had been asked earlier, when they could have been more easily accommodated. In ICI one of the purposes of project control is to facilitate planned and controlled change.

Discussion

During the research it was found that both client and construction companies were quite willing to help. Good relationships have been established with a small number of clients which will serve as a strong foundation for the next phase of the research. The collection of the data from only a few clients is justified on the basis that the unit of analysis is conflict and not clients *per se*. The approach adopted reflects the claims of Moser and Kalton (1971) that, 'the intensive study of a few cases tends to dig *deeper* than studies involving the use of standardized, formal methods with large representative samples'.

Projects for use as case studies in the next phase will be identified in discussion with the main contact already established within each of the collaborating client organizations. The two constraining variables will be the date of completion of the project and the size of the project. The ability of project participants to recall project relationships and activities can only decrease with time so for projects completed earlier the information provided will eventually begin to lose its freshness and clarity. However, the study of on-going projects may not produce the right information either; there may be several 'live' examples of conflict with unknown outcomes or the client may see a conflict in a different light following completion. Consideration of project size is also important since larger and more complex projects tend to have greater potential for conflict.

A network to facilitate communications with project personnel will be established for each project of interest, detailing the repondent's address, telephone number, project activities, etc. A wide range of personnel will be contacted from a senior member of the client organization, through to the lowest level of user of the finished product. Links shall be made between related conflict episodes and project changes, and the outcome of each conflictful situation shall be determined, including to what extent it has been functional or dysfunctional.

It is expected that following the completion of the research, by the end of 1992, the location of important conflict and change occurrences in construction projects will have been clearly identified in terms of the four project contexts outlined in this paper. This information, together with a knowledge and understanding of the underlying conditions which cause conflict and necessitate change, will enable practical recommendations to be made regarding the formulation of project management strategy. The outcome of these will be to alter the impact of conflict and change in the client's favour.

Conclusion

A methodology had been described and tested for the study of conflict and change phenomena within construction projects. A number of existing research models and

techniques have been touched upon to provide a frame of reference for examining the strategic impact of conflict and change in construction project management.

From an academic point of view, a broader application of the findings is more desirable than a narrow one. This has been achieved to some extent by analysing conflicts at a low organizational level in which it is less important who the client is, how the project is organized, whether or not a project quality or control system is being used, or which conditions of contract have been adopted. Indeed, it has not been the purpose of the research to recommend best practice in any one of these areas, but rather to present a method for identifying the circumstances and conditions which accompany process and organizational conflict and change.

The methodology presented here will form the basis of a second and larger investigation to measure more fully the role of conflict and change in construction projects, and to develop project management strategy in the light of this new knowledge. The results of the preliminary investigation suggest that the creative management of conflict and change needs to be actively pursued by project managers, and that it is no longer sufficient to rely only on a 'common sense' point of view.

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References

Ashford, J.L. (1989). *The Management of Quality in Construction*. E. & F.N. Spon, London.

Bowditch, J.L. and Buono, A.F. (1990). *A Primer on Organizational Behaviour*, 2nd edn. John Wiley & Sons, New York.

Bresnen, M.J. and Haslam, C.O. (1991). Construction industry clients: a survey of their attributes and project management practices, *Construction Management and Economics*, **9**, 327–42.

Chartered Institute of Building (1982). *Project Management in Building*. CIOB, Ascot.

Cherns, A.B. and Bryant, D.T. (1984). Studying the client's role in construction management, *Construction Management and Economics*, **2**, 177–84.

Construction Industry Research and Information Association (1985). *Quality Assurance in Civil Engineering* (Report 109), CIRIA, London.

Cornick, T. (1990). *Quality Management for Building Design – A Model for Process Control*. Butterworths, London.

Corwin, R.G. (1969). Patterns of organizational conflict, *Administrative Science Quarterly*, **14**, 507–20.

Crichton, C. (1966). *Interdependence and Uncertainty: A Study of the Building Industry*. Tavistock Publications, London.

Deutsch, M. (1969). Conflicts: productive and destructive, *Journal of Social Issues*, **25**, 1, 7–41.

Fisher, G.N. (1984). Towards a general model of project monitoring and control systems – as used by broadly similar and successful building contractors. *Proceedings CIB w-65*, **4**, 1351–62.

Gardiner, P.D. (1991). Example project control procedures of the University of Durham, unpublished report, University of Durham.

Garrett, A. (1970). *Interviewing – Its Principles and Methods*. Family Service Association of America, New York.

Handy. C.B. (1983). *Understanding Organizations*. Penguin Books, Harmondsworth.

Hendrickson, C. and Au, T. (1989). *Project Management for Construction: Fundamental Concepts for Owners, Engineers, Architects, and Builders*. Prentice Hall, New Jersey.

Higgin, G. and Jessop, N. (1965). *Communications in the Building Industry*. Tavistock Publications, London.

Kim, M.P. and Adams, K. (1989). An expert system for construction contract claims, *Construction Management and Economics*, **7**, 249–62.

McGivering, I.C. (1983). Conflict. In *A Handbook of Management* (edited by T. Kempner), pp. 94–5. Penguin Books, Harmondsworth.

Moser, C.A. and Kalton, G. (1971). *Survey Methods in Social Investigation*, 2nd edn. Gower Publishing Company, Aldershot.

Oliver, G.B.M. (1990). *Quality Management in Construction: Interpretations of BS 5750 (1987); 'Quality Systems' for the Construction Industry (SP 74)*. Construction Industry Research and Information Association, London.

Pondy, L.R. (1967). Organizational conflict: concepts and models, *Administrative Science Quarterly*, **12**, 296–320.

Pondy, L.R. (1969). Varieties of organizational conflict, *Administrative Science Quarterly*, **14**, 499–505.

Riley, J. (1990). *Getting the Most from Your Data – A Handbook of Practical Ideas on How to Analyse Qualitative Data*. Technical and Education Services, Bristol.

Skitmore, R.M. and Marsden, D.E. (1988). Which procurement system? Towards a universal procurement selection technique, *Construction Management and Economics*, **6**, 71–89.

Walker, A. (1988). *Project Management in Construction*, 2nd edn. Blackwell Scientific, Oxford.

Walton, R.E. and Dutton, J.M. (1969). The management of interdepartmental conflict: a model and review, *Administrative Science Quarterly*, **14**, 73–84.