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The rationalization of quality in the construction industry: Some empirical findings

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The industry's attempt to rationalize construction quality is examined. Two schools of thought are identified. While the determinist school of thought envisages a belief that every construction element can be quantified and accounted for in writing, the indeterminist school, on the other hand, suggests otherwise. The socio-political effects on quality as well as the technical safeguards taken by both the contractor and the employer are investigated. Emphasis is then directed towards workmanship and the relevance of Quality Assurance as a management process for achieving quality standards in the construction industry. The empirical results of a field study from six building sites in the West Midlands, England are presented to highlight the salient factors which influence respondents' perceptions and attitudes towards construction quality. The findings from this study tend to mirror the existence of both the rational and irrational approaches to quality in the construction industry. The industry needs to recognize this phenomenon in its attempt to institutionalize any procedure to both achieve and maintain quality construction.

Keywords: Quality, Quality Assurance, workmanship, rationality, irrationality.

Introduction

One of the primary objectives of any building procurement exercise would be to obtain a quality standard which matches the client's expectations. As a result, there has always been interest in what constitutes quality standards in the industry and how these can be maintained, improved and assured. An understanding of what constitutes quality appears to be the first logical criterion which needs to be satisfied before measures can be taken to achieve it. At the onset, most practitioners have the impression that they know what quality means. It is such a simple word, the meaning of which cannot be mistaken – or so it seems.

Judging from the sheer volume of literature devoted to this issue, it would, however, appear that quality is indeed a difficult term to define (Low, 1987). Numerous studies have highlighted the difficulties faced in understanding and interpreting quality in relation to construction. Each study has its own contribution to make within its respective terms of reference, but the meaning of quality in construction appears to encompass far wider implications. Quality in any single building operation or component seems to be readily assessed, described, explained, judged and generalized. Nevertheless, quality does not seem capable of being defined meaningfully for construction projects as single entities over time. It is even more difficult to quantify quality elements. As Ferry (1984) has acknowledged, 'The definition of quality in building is much more difficult and it remains doubtful whether it will ever be possible to measure quality, although it may be possible to measure some of its attributes. It might even be possible to arrive at some sort of weighted index by assessing some factors and measuring others, but this would contain so many subjectivities both in the assessing and the weighting that its usefulness could be questioned'. Low (1987), likewise, noted that there was no consensus on a single definition of quality. Quality cannot therefore be defined easily and an understanding of what quality is can only, at best, be described and explained, albeit within its own frame of reference. The emergence of five different schools of thought from within the multitude of literature was noted. These are either attempts to place quality within a framework of reference for better understanding or define quality to mean:

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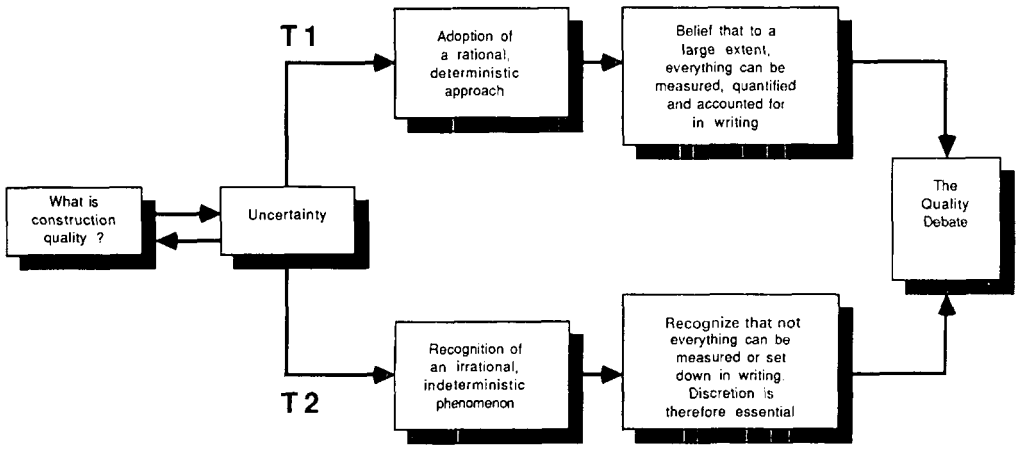

Figure 1 The rational and irrational model to defining construction quality

1. Fitness for purpose.
2. Conformation to specifications.
3. Fitness for purpose and conformation to specifications.
4. System approach: technical rationality.
5. System approach: socio-technical rationality (Low, 1987).

The last two schools of thought urged practitioners to consider quality construction in its totality from a system perspective. Just as organizations are made up of people and have characteristics reflected by the dominant coalitions within them, systems and subsystems, likewise, are also affected by this phenomenon. Research studies into construction quality have typically acknowledged but did not adequately discuss the influences from these socio-political factors. As Freeman and Bentley (1980) observe,

> Whilst there are well-recognised responsibilities for ensuring that the quality of work is executed as specified, the realities of the situation on site are that only the quantity is ever likely to be rigorously exacted. Quality is, to a degree, 'negotiable' because it is difficult to define in the first place, leaving its interpretation a matter for judgement. Simple 'go, no-go' criteria are seldom applicable. The quality that finally emerges is the product of a highly complex 'system' in which the standard of the project information, availability or otherwise of relevant professional, managerial and trade skills, individuals' motivation, and pressure of time and finance all interact.

Quality is therefore a multi-faceted concept and should be approached and managed as such.

The ambiguity of quality issues within the dichotomous framework of rationality and irrationality were subsequently reviewed by Low (1989), and Seymour and Low (1990) for the construction industry. Two main concepts were advocated in the process as practitioners struggled at length to define what quality in construction actually entails. The dichotomy within which the current quality debate prevails is depicted in Fig. 1 where the two tendencies (T1 and T2), representing the two concepts, emanate from the very fundamental question of what constitutes quality.

Proponents of T1 have a tendency to adopt what appears to be a simplistic but more objective approach where economic order predominates. There is an inclination towards specifications, preambles, drawings and bills of quantities, etc., where checklists can be compiled and where the quality game is played strictly within the boundaries of written rules. Contravention of these provisions is therefore considered unacceptable. Attempts to formulate various guidelines and checklists to cater for all conceivable construction events and activities are examples of the phenomenon found in T1. In a further attempt to reduce ambiguities, the management process of Quality Assurance (QA) was also implemented and faithfully adhered to by some sectors of the construction industry. The very definition of QA itself – i.e. 'all those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality' – lends support to the contention that quality can be administered through distinct, formal and extensively documented procedures.

In contrast, the second tendency, T2, recognizes that most quality issues in construction are not as simple and definitive as those in T1 would like them to be. A complex socio-political cum technical perspective is postulated in T2. There is now an implicit recognition that to a certain extent, not everything in construction can be measured meaningfully, quantified or set down specifically in writing. Even where these can be achieved satisfactorily, proponents of the second tendency have warned of the restrictive circumstances under which these provisions can be made operable. Both the innate human and interactive social factors within the institu-

tional framework of the construction industry seem to have an undermining effect on the various provisions laid down and faithfully adhered to by proponents of the first tendency. Instead, proponents of T2 have continually maintained the significance of professionalism and its corresponding effect on attainable quality standards. Hence, there is no single paradigm which can be regarded as definitive in so far as the maintenance of construction quality is concerned. A certain amount of leeway has to be allowed for, within which practitioners negotiate and adapt until an acceptable level of quality is obtained. As noted in 'The Quality Debate', the imposition of external constraints within the occupational framework of the various professions is therefore likely to arouse resistance on the part of those whose professional independence is now jeopardized (Seymour and Low, 1990). The role of QA (a component of T1) in construction appears to create such an impression in so far as the *discretionary power* of the traditional professions (a component of T2) is concerned. QA seems to delimit freedom within the occupational order of the various professions at a time when operational discretion is required to regain the much needed balance in the industry. The two dichotomous approaches – i.e. objectivity versus subjectivity, deterministic versus indeterministic and rationality versus irrationality – therefore form the basis for this study into quality in the construction industry. The terms adopted to describe the two spectra of this dichotomy are assumed to be synonymous. In the context of this paper, objectivity is defined as the treatment of facts without distortion by personal feelings or prejudices. Subjectivity is defined as the treatment of facts within one's self of mind in contrast to what is objective.

In view of the above contentions which posit the dichotomy of interpreting quality, this paper seeks to provide the salient empirical evidence to test the two following hypotheses:

1. There are two tendencies (T1 and T2) within the construction industry in so far as the interpretations of quality are concerned. While T1 tends to be deterministic and rational, T2 appears to be both situational and less certain in its approach.
2. The attempt to implement QA systems within the construction industry has given rise to resistance from the other more established professions because the traditional balance of occupational order has now been disturbed.

Research methodology

An attempt was made to test the validity of these two propositions through empirical means. Six building sites in the West Midlands, England were subsequently selected for study. No particular criterion was used for the selection of these sites. They were basically chosen because of their owners' consent to participate in the study and their close proximity to the University of Birmingham where the study was based. These covered a diverse range of projects at various stages of construction and varying in contract sums between £20 000 and £2.0m. Their brief profiles are set out in Table 1.

Approach for this field study was generally in accordance with similar procedures documented in three reorts published by Bentley (1981), BRE (1982) and BEDC (1987). The spate of interests in construction quality in the UK was sparked off by an earlier NEDO's (1976) report on the 'The Professions in the Construction Industry', which in turn was amplified further by a BRE survey of building quality and value undertaken by Burt (1978). In the BRE (1982) report, a detailed study of 15 sites was made over a period of 3 years. The BEDC (1987) report was similarly based on an investigation of some 38 sites spread all over the UK. However, for the purpose of this paper, it was felt that the six sites selected for the study would be sufficient to test the above hypotheses and that a greater number of sites would neither help to improve nor refine the results. Like the three studies above, the perception and management of quality in construction constituted the main aspects of this study for the two hypotheses.

A two-pronged approach was adopted for the study. These included participative-observations and the formulation of a list of questions for in-depth interviews with site personnel and the design team members. In this case, a participant-observer role was adopted and site observations were made along with the building clerk-of-works making his rounds, visiting sites at random, observing and yet, at the same time, taking care to maintain a neutral profile so as not to prejudice the conduct of on-going site activites because of the researcher's presence. It was felt that the presence of the researcher alongside the clerk-of-works was largely ignored by other site personnel after a period of about 2 weeks. Observations were supplemented by semi-structured interviews and, with the appropriate consent of those involved, tape recordings of these interviews and verbal exchanges (for example, the proceedings of a meeting) on site. The evaluation for this research study to test the propositions above was drawn in the main from personal observations, transcripts of tape-recordings and in-depth interviews. Appropriate measures (for example, pilot testing of the list of questions and the conscious exercise of impartiality during observations) were taken to ensure that only reliable and realistic data were accumulated. It was originally thought that most respondents would be unwilling to be interviewed or narrate their true feelings on matters relating to quality of their building projects. These fears were however,

Table1. Profiles of building projects studied

Site	Project details	Approximate contract value (Sterling Pounds)
A	Erection of a new brick and timber bicycle shed with pitched roof to provide secured cycle storage. Contract procurement was carried out by one of the employer's in-house building surveyors.	20 000
B	Erection of 10 blocks of three-storey student flats; each flat consisting of five single study bedrooms, a sitting room, kitchen, toilet and bathroom facilities. With a total of 300 single bedrooms, the contract also includes ancillary landscaping, street-lighting and access road construction, etc. under a design-and-build package.	1 600 00
C	Refurbishment works to convert existing buildings to accommodate the computing facilities of an educational establishment. Extensive stone-cleaning of the building facade was also included in the contract. Outside consultants were engaged by the institution for this project.	2 000 000
D	Extension to a single-storey conference-cum-residential centre to provide additional bedrooms and lecture facilities. The building was constructed with traditional blockwork with timber roof trusses tiled over. Outside consultants were appointed by the employer for this project.	200 000
E	Repair and remedial works for a recently completed two-storey brick building to be used for research and development purposes. This constitutes Phase I of a larger development scheme. The contractor was back on site to make good 41 items listed in the Schedule of Defects issued to him at the end of the Defects Liability Period.	700 000
F	Extension and alteration works to a private residential house which included the complete replacement of existing roof tiles, erection of a new garage complete with driveway and additional bedrooms above the new garage. No consultant was engaged by the employer for this project and the entire work was undertaken by the contractor on a lump sum basis.	25 000

unfounded as most interviewees generously gave their time to discuss the issues of quality in detail.

For the purpose of this paper, anecdotal illustrations and verbatim quotations will be used as these will be able to convey the research findings better than any other approach. It was felt that the emotions and personal attributes of the respondents can be reflected much more readily through this method of presentation. The inferences for the two tendencies, T1 and T2, can then be drawn accordingly.

This paper will first present the socio-political effects on construction quality before proceeding to technical provisions which seek to clarify ambiguities which may arise in quality issues. The precautions and socio-economic safeguards taken by contractors and employers ensuring quality construction works will then be examined. The two important components which have a significant contribution to quality achievement – namely, workmanship and QA – will finally be examined.

Socio-political effects on quality

Organizations within the construction industry are made up of people with diverse interests and goals. The operation of vested self-interest, even if small in many ways, may collectively result in actions which can have an adverse effect on quality. Conflicts inevitably arise as the power of the various participants is wielded to influence organizational decisions. As Handy (1985) has suggested,

> To neglect or by-pass the political reality of organisations would be misleading or blind or both, since all organisations of any size are political systems. In all organisations, there are individuals and groups competing for influence or resources, there are differences of opinions and of values, conflicts of priorities and goals. There are pressure groups and lobbies, cliques and cabals, rivalries and contests, clashes of personality and bonds of alliances.

Where priorities clash, power and authority of the dominant coalition are usually invoked either through heirarchical, occupational or contractual means. During the course of studying the six West Midlands building sites, sporadic incidents of this nature were observed which appeared to have a dire influence on construction quality. By way of example, the two most notable incidents are addressed here.

As agents for their clients, architects are responsible

for ensuring that the works are carried out in accordance with their designs. It has, however, been alleged by site personnel that most architects rarely visit the site and consequently quality may suffer as a result when faulty workmanship and materials are not detected promptly. Preoccupation with other works are often cited by architects as the main reason for not being able to visit the site frequently and hence the task of inspection is often left completely to the clerk-of-works. However, this may not always be the genuine explanation as to why architects avoid going to the site as often as they are required to. The probability of being implicated in lawsuits for alleged negligence becomes perceptively higher when visits are more frequent because there would then be a correspondingly greater number of queries from the contractor's site staff. The professionals are not ignorant of this reality and as one architect admitted,

> the architect, if he goes to site and he comments upon works, the way the contract is at the moment, the builder can use that against him. And that happens every time I go on to site. The foreman will say to me: 'Is the manhole okay?' If I turn around and say: 'Yes', and if it then fails, he could turn around and say: 'Well, I asked the architect and he said that was okay.' It is very tricky not giving comments, which is one reason for not going to site.

The second incident involved the submission of claims for mileages to sites by one M and E clerk-of-works to his immediate superior in an educational establishment. Due to the magnitude of his claims, the clerk-of-works was urged by his superior to reduce the frequency of his site visits, to the obvious displeasure of the former. As a result, bickering ensued Not considering the possible difficulties which his superior may face in justifying his unusually high mileages to higher authority, the clerk-of-works proceeded to explain his lamentable side of the story:

> When I put my mileage in on previous occasions, he turned at me and said: 'You have to cut it down!' 'Well, how do you want me to cut it down?' Well, I know,' he said, 'Call at the site once a day.' I said: 'Well, okay, if I call at the site and there is a fault, I must put up with it today. We come in tomorrow and put today's fault right.' He said: 'You are being ridiculous!' I said: 'No, you are being ridiculous. You tell me how I should function now. You are limiting me on how I can do my job!' Now, I want to do my job but he is now putting restrictions on how I should apply the job on the fact that he is in charge of the mileage. If the person on the job site knows that I can only visit the site infrequently, he will know what to be good for, what to hide. In other words, because when visiting the sites, we won't visit at a set time. You can't because there must be this element of surprise.

These two examples show that the rational approach to procuring quality construction may at times be subjected to socio-political influences. While the architect in the first example would like to fulfill his professional obligation to ensure that quality works are attained, he is, on the other hand, wary of exposing himself to unnecessary legal liabilities if he comments on quality matters at the site. In the second example, while the clerk-of-works would like to perform his task of inspection to achieve quality construction, he is, however, restricted by resource constraints from visiting the site too often. These observations tend to support the concept posited by T2 which suggests the dilution of objectivity in evaluating and managing quality.

Technical clarifications

In addition to express provisions made or to be made in contract documents, six methods were observed to be adopted by participants in construction projects to arrive at a common understanding as to what quality standard is required or offered:

1. The employer or his representative will direct the contractor to a specific building and say to him 'This is the quality we expect from you'. One design-and-build contract studied has incorporated provisions that 'The blocks of flats are generally to be identical in appearance, layout and room size to the flats provided in Phase I. The specification for this contract is not to be less than that for Phase I.' There appears to be an understanding that when this approach is used, older buildings will tend to be excluded because of the accepted knowledge that their qualities are difficult to achieve by today's standards. This approach is commonly used during the tender stage where the contractor is required to visit the site before tendering so that he may become acquainted with the quality standards of surrounding buildings.
2. Alternatively, the contractor will direct the employer or his representative to one of his completed or on-going projects and say 'This is the quality we can offer you.' The contractor will naturally direct attention to only the best and, quite often, prestigious projects. One stone-cleaning subcontractor admitted that his objective in producing good quality work was for the purpose of using it to market his services and to obtain repeat business in the future.
3. Samples of homogeneous materials such as anchor bolts, timber grounds etc., were shown to the architect/clerk-of-works before the contractor uses them on site. All subsequent deliveries are then expected to be generally of the standard of the approved sample.

4. The contractor fabricates samples of heterogeneous materials on site for the architect's approval before incorporating them into the actual works. For example, pebble-dash finish on a 600 × 500 mm fabricated blockwork panel was noted on one site for this specific purpose.
5. The contractor builds a mock-up of a small portion of the actual work for the acceptance of the architect or clerk-of-works before proceeding further with the works. For example, the fabrication of part of a new roof structure for the clerk-of-works' acceptance; the preparation of one stone panel for the architect's approval before stone-cleaning operations are launched full-scale on site, etc.
6. The contractor and architect/clerk-of-works refer to the relevant manufacturers' literature to reach an agreement on the quality which can be obtained from the market at a price which the client is willing to pay.

These six methods appear to be rational approaches adopted by practitioners to define quality. Once the expected quality standards are conveyed either from the client/architect/clerk-of-works to the contractor or vice-versa, these standards are accepted as the norms for achieving quality construction. Although these methods can be easily agreed upon by all parties, they are not without any demerits in so far as overall quality is concerned. The quality of a particular building component or activity may be specified readily, but only within its own terms of reference. Quality can no longer be ensured once that building component or activity interfaces with other construction components or activities which do not conform to the previously agreed quality standards. As construction is a complex process, the likelihood of interfacing between different building components or activities is bound to arise. Although the industry may seem to have solved the difficulty of defining quality standards using the above methods which are necessarily specified narrowly, the attainment of these standards tends to get muddled up as construction processes, components and personnel interact with one another from a systemic perspective. This again lends support to the second hypothesized concept T2 which suggests that quality standards are 'negotiated' into construction amidst the large number of interfaces encountered in the industry.

While some of the contractor's practices were specified under the contract, others such as methods of working need not be referred to the architect for approval. However, there appears to be a lack of contractual understanding by some of the contractors' site staff and hence points towards their anxieties for constant reassurances from those in authority that their works are acceptable in so far as quality is concerned. It then looks as if there is a genuine desire on their part to satisfy those in authority but this may actually be a subtle way of off-loading their responsibilities, and as pointed out by one wary architect,

> I find that the contractor is always trying to offset any of the things that he has built down back onto the architect or back onto the design team. And it is very difficult to get out of it. If you are on site, he says: 'Can you check this? Can you look at that?' If he has built it to your specifications, okay, why should he want you to look at it and give a judgment on it if it has been built to your design in the first place.

This example shows that the concern for technical clarity on the part of site personnel need not necessarily be genuine as it may simply amount to veiled attempts to pass the buck on quality judgement back to the design team members.

Precautions taken by contractors

Outside the scope of the main contract, there were indications that contractors were aware of the gradual decline in quality standards and have resorted to certain practices to ensure that acceptable works are produced by their direct employees, subcontractors and consultants. The uncertainties for the contractors in using self-employed subcontractors were largely eradicated by closer supervision and the use of reliable and familiar gangs who have worked for them before. In one large building site where different gangs of self-employed bricklayers were used for the construction of 10 blocks of flats, the contractor has maintained his vigil by allocating specific blocks to different gangs so that records can be kept of the performance of each gang. As the site manager on this project explained,

> If you are operating what we are doing as a management team, you will be using subcontract labour. We tend to use the same people, you don't go for fresh bricklayers unless you absolutely got to because once you do, you are accepting the situation where you got to let them do some work to see what they can do.

On another large refurbishment projects, the contractor has appeared to adopt the same practice to ensure that his subcontractors are used discreetly. The foreman on this project explained:

> Now, I mean on the roof, we have got two carpenters working, putting the rafters on. Now those two carpenters work for a subcontracting firm and I have actually worked with them before. The same subcontractor worked on our last hotel job and so we do know more or less what we have got coming in. But you still got to bring in the new ones occasionally, you got to bring in someone you haven't met before. If his price was really what you thought, think was

> competitive, you give him a try but then you make notes of it as he performs. You remember it. If anyone is not doing the right job, then he has got to go.

However, for small contracts where overheads are low, it would appear irrational to deploy full-time supervision on site. From the case studies of two small building sites with contract values of less than £30 000, there seemed to be an understanding that 'roving' supervisors are acceptable. These are the contractors' supervisory staff who move between several small contracts, visiting any one particular site at least once or twice daily to keep track of the progress and quality of works. Nonetheless, the contractors have recognized that supervision is the only effective way to maintain quality standards. The same foreman on the refurbishment project continued:

> I mean, as it is now, we are doing the demolition. So therefore I needn't be so concerned out there. But once we start rebuilding, I've got to watch everything. Everything has got to be watched. I've got to miss nothing. You've got to watch everything to get quality.

Apart from supervision, the contractors also appeared to be vigilant in their use of labour as a first precaution. It would seem that dismissals are often resorted to for recalcitrant workers whose performances are persistently below par. As one site manager described the sanction he has over the workforce,

> If I get a bricklayer on site who becomes uncontrollable, in other words, he can't achieve the standards or won't achieve the standards despite being told a couple of times, then eventually I have to make the decision and say to him, 'Pack your bags and get off the site.'

While a contractor is vicariously liable for his employees during their course of employment, the circumstances are somewhat different when he deals with subcontractors and consultants. Although there is a chain of liability in contract, the contractors often felt it prudent to require their subcontractors and consultants to have insurance polices drawn up to cover eventual liabilities arising out of any shortfall in quality. As the site manager on a design-and-build project explained,

> We take the total responsibility and then follow it up in various sections. It is to our own advantage to see that each and everyone of those subcontractors or professional people that you go to are fully covered against any eventualities. But we also want to see his third party liability insurance forms that tell us we are fully covered for the next ten years. If the road breaks up two years after the project is finished, they would either have to come back and make good or their insurance will have to pay another contractor to do that remedial work.

Regardless of whether materials are ordered by the contractor or through his subcontractors, it appears that they will also endeavour to check on the quality actually delivered to site from the suppliers' invoices. In the case of ready-mix concrete, where the consequences arising from the supply of a wrong grade are recognized to be extremely drastic, contractors often seek to safeguard their liabilities through suppliers' guarantees. As one contractor said,

> I want to check the tickets. Is he ordering the right concrete? No ready-mix firm will supply you with concrete different from what is on the ticket because I have cubes to gather to send to the laboratory for testing.

The above examples clearly highlight the pragmatic approach taken by contractors to safeguard their own interests in so far as the achievement of quality standards is concerned. These are again logical approaches which contractors adopt in an as objective manner as possible. The utilization of trustworthy and skilled labour, the need for close supervision and inspection, and the exercise of economic power in dismissing workers who cannot perform are some of the measures taken by contractors along the T1 tendency. These are logical measures which the employers have, likewise, translated into socio-economic safeguards.

Employers' socio-economic safeguards

Within the socio-economic structure of the construction industry, it would appear that the employers, as the ultimate paymasters, have an upper hand in their dealings with the contractors because of their economic superiority. This understanding was noted in one small house extension project where the provisions for interim payments have not been agreed upon formally. Nevertheless, the employer here has exercised his discretion by withholding payments to the contractor until defective works are removed and made good. As one building surveyor acting on behalf of an educational institution acknowledged when he referred to the workers on site, 'We have therefore the final say because we have the money and these guys here want the money.' Apart from contractual provisions, the economic superiority an employer has over the contractor appeared to be well recognized. One site manager thought that where disputes are not resolved with the architect, there is always a possibility that the latter 'will go back to the old-age business method whereby the architect will say: "You'll bloody well change it or we won't pay you."'

Prequalifications and the shortlisting of contractors can serve as another safeguard for the employer within the socio-economic framework to reduce the risk from those contractors who are unlikely to have the ability to produce the quality standards required. A looming sanction can be implemented when contractors, who

have not performed to the expected standards, face the possibility of debarment for furture tenders. One employer's quantity surveyor had described how he administered the contract:

> On virtually every contract, we invite a certain number of contractors to tender. We picked the contractors who are to tender. We therefore feel that if we have decided the four or five firms perhaps to tender for this job or the six to eight firms to tender for that job, we must find those contractors who are all right to work with. If they produced sub-standard quality, then we stop inviting them to tender and gradually that will mean they would do no further work for us and there are people in that category. So we are the ultimate sanction. We are the sanction on the job itself by insisting that the work should be taken down and be re-done or that some additional work should be done to hide the weakness of the work. And the ultimate sanction is to say; 'Well, thank you very much. I mean you won't get any more jobs!'

Like the contractors who rely on T1 measures to achieve quality standards, employers, likewise, will not hesitate to invoke the economic order to ensure that the quality standards delivered to them are what they have bargained for (Seymour and Low, 1990). The empirical evidence highlighted above appears to show that there is explicit recognition of the economic order and that the employers will, if necessary, wield their power of determination as the ultimate paymaster.

Workmanship

The constitutional requirements for professionals to pursue excellence in design coupled with the reality of lawsuits for malpractices have served to counteract any tendency on their part to lose sight of the need to achieve a minimum standard of professional practice. While quality of design can be ensured to a certain extent in this manner, conformance to various British Standards and the achievement of Agrément Certificates and such like, are in turn evidence of the attainment of minimum standard materials supplied by builder's merchants and manufacturers. However, design and materials, no matter how well-intentioned their standards are, are unlikely to achieve the desired quality results if these are not fabricated and put together in a manner befitting good workmanship. The critical nature of workmanship in relation to quality design and materials is of utmost importance because of its permanent nature. In so far as design and materials are concerned, these can be redesigned or reselected before incorporation into the permanent works. However, works that have already been fixed in place cannot be readily rectified without some degree of expense, disturbance and inconvenience.

It seems that this crucial understanding has not been well publicized within the industry other than the call for more vigorous training of workers and the incorporation of workmanship clauses within specifications – the latter predominantly to serve as a contractual safeguard for the employer. However, even if design and materials are built down to a price, it would appear that there is an understanding that the workmanship needed to put these together is expected not to be any less onerous. One architect expressed this expectation when he said:

> The oak panelling is of superb quality compared to woodchips paper. But there is workmanship involved in applying the oak panelling and there is workmanship involved in hanging wallpaper. Now I would be expecting perfection in how they hang the wallpaper although it is not giving me the same quality finish as the oak panelling but I can still expect the workmanship to be one hundred percent.

Training naturally inculcates the skills required to perform work. But skills alone are insufficient to produce the workmanship desired if there has been a lack of care in exercising skills. It looks as if workmanship is a function of both skills and care and it is generally, to a greater extent, the lack of care which results in shoddy workmanship. To understand what care actually entails, demolition labourers working in a refurbishment site were interviewed. It was suggested, quite appropriately, that this occupation is devoid of skills, the dominant criterion of which is care in using both the sledge-hammer and crow-bar. The labourers interviewed indicated that care is:

1. Knowing what you are doing. It is common sense.
2. Being sure of what you are doing. If in doubt, always ask.
3. Avoid breaking up things which are not to be broken.

It would seem that workmanship problems have long been recognized by the industry judging from the various provision made in British Standards, Codes of Practice and the incorporation of workmanship clauses into project specifications. However, because British Standards provisions are scattered in many different documents, it becomes difficult for the specifier to collate the relevant workmanship clauses together for a particular project. Mere references to British Standards numbers in specifications, although making the job of the specifier easier, appear to be of limited use to site staff because of the lack of adequate facilities on site for consultation. On the other hand, the repetitive drafting of common workmanship clauses in specifications everytime there is a new contract, it was submitted, is an inefficient way of administering the procedure. This apparent understanding by the practitioners led to a proposal to the British Standards Institution (BSI) in the 1960s to codify a national standard of workmanship

for use within the construction industry. However, it was not until August 1985 that the BSI issued the first draft based on the recommendations made more than 20 years ago. Consisting of over 800 pages spread out in 20 separate volumes, it was a restatement of workmanship clauses based, where possible, on the relevant British Standards. Its purpose was to define the requirements of basic workmanship common to the majority of building projects so that:

1. The standard can be invoked in building contracts as the source of descriptions of basic workmanship in place of clauses usually provided as part of individual project specifications.
2. There is improved communication and understanding within the industry on the basis of one document common to all contracts.
3. The document can be used on building sites as a tool for controlling the quality of workmanship and assist in the judgement and settlement of disputes, and
4. The document may serve as reference material for operatives, supervisory staff and specifiers on site. (NB. This standard was eventually issued as *BS 8000: Workmanship on Building Sites* by the BSI soon after the completion of this research study.)

This represents, in essence, a systemic approach to controlling workmanship problems in the industry, a phenomenon classifiable under the first tendency, T1. The bulkiness of such a document may be attributed to its attempt to cover every conceivable activity one is likely to encounter in the construction industry. However, in purporting to provide a heuristic tool for practitioners, its very approach has brought into question its corresponding perceived usefulness for the industry. As Perrow (1973) has maintained,

> The systems view is intuitively simple. Everything is related to everything else, though in uneven degrees of tension and reciprocity . . . But as intuitively simple as it is, the systems view has been difficult to put into practical use. We still find ourselves ignoring the tenets of the open systems view, possibly because of the cognitive limits on our rationality.

To examine how the draft workmanship standard would be received in so far as its purpose was concerned, investigations were made with potential users to this effect. There were mixed reactions, judging from the responses to the investigations made. When this question regarding the usefulness of the standard was posed to a clerk-of-works during one of his rounds of site inspection, he commented:

> We don't normally refer to the British Standards or Codes of Practice unless there is a court case and we need to say to the other guy, 'Look, you are not giving us the stuff the Codes of Practice or British Standards say.' On site, there must be some leeway for the contractor, otherwise he can never finish the work. The workers will not know what you are talking about if you refer them to the Code of Practice. As I said before, if the work is in the ground and will eventually be covered up, then we will allow some leeway as far as appearance is concerned. But not for the facing bricks where everyone can see.

It seems that a bulky document is not an objection for its use if its bulkiness can be justified on the grounds that it covers all essential issues. As a practitioner, one is expected to be aware of what is required either from knowledge or through experience and because of this understanding, one is not expected to carry these documents around on site nor refer to them unless the need arises. In response to this issue of bulkiness, one architect replied,

> Very bulky, yes. But it covers all the items of workmanship that you could want. But you see, that is again the role of the clerk-of-works and the knowledge of the architect. When they are walking around on site, they should be aware of that specification. If you were to design a building, you would know what the building was about in its finite details. You would know the sort of quality of finish, the sort of plaster finish you are after and what you will accept and what you won't accept.

On the contractor's side, the notion of using such a standard as a tool to controlling the quality of workmanship on building sites does not appear to be attractive either. When the potential usefulness of such a document was brought to the attention of one foreman, he retorted:

> Now, you are becoming too theoretical. No, I don't follow any guidance at all. As I said, I know from experience what are the things to look for and where to look for them. It depends on the types of work on site.

Another respondent, a site manager, who was aware of the then draft standard but has not actually seen a copy of it was equally critical and was rather skeptical about its usefulness. He commented that

> People talk about standards but when you get down to doing it on site, it doesn't mean anything. And you read it through and it is not in everyday language. It is almost like a lawyer language. And invariably, if you get down to the nitty-gritty, if you get a clerk-of-works who says it doesn't comply and you got the site manager who says it does comply, generally, I will defy anybody to reach agreement because they take that thing out and it is so wordy, it is so loosely worded, you don't make it to mean anything. Now, they have got a bit wordy for on-site everyday use, not for a couple of lawyers fighting a battle in courts. That is no good to us at all. It will

> be another piece of paper that is down in the desk drawer and it only comes out when he has got a battle on his arm because somebody challenged him. I don't keep a set on site which is obviously too costly and too bulky.

It looks as if standardized documents of this nature are likely to be under-utilized on site if these are ever invoked into the contract. The fact that this standard concerns basic workmanship common to the vast majority of building projects will tend to diminish its role further because, as it appears, practitioners have a common body of knowledge and understanding of what constitutes good workmanship for operations which are commonly encountered on site. To expand on this further, what encompasses good quality in construction can therefore be said to be recognizable readily within the reasonable bounds of practicalities. Other than the need for *ad hoc* project specifications to cover unfamiliar grounds, for pragmatic reasons, any standard specifications catering for the obvious would seem to be unnecessary unless these are invoked solely for contractual purposes. Otherwise, it would merely serve to add on to the information explosion without actually resolving the real issues. As Redfern (1980) has pointed out on behalf of the BRE, 'Faults occur despite – or perhaps because of – the prodigious quantity of information, recommendations and mandatory requirements that already exists.'

So although the standard is commendable in overcoming anticipated difficulties in contract documentation and in safeguarding the employer's interests in the event of a dispute in this direction, it does not seem to address the more fundamental issue of how good workmanship attitudes can genuinely be cultivated throughout the industry apart from the use of contractual force. It appears to be a precautionary measure in favour of the specifier and the employer rather than a long-term remedy to the more fundamental problem.

It is clear from the above observations that workmanship is indeed an important component which contributes to quality construction. The recognition of this importance seems to be the driving force behind the codification of workmanship specifications for the building industry. Since construction is a complex process which encompasses many trades, the task of codifying all workmanship clauses into a single document is understandably a massive one. This attempt is clearly an objective one as there is now a need to systematically document all information which pertains to workmanship on building sites (T1). That the end result of this exercise is cause for concern because of the massive amount of documentation involved seems to indicate that there is an opposing force from T2. As the above verbatim quotes have highlighted, although there was a general appreciation for such an attempt to document workmanship clauses for the building industry, skepticism regarding the usefulness of this massive exercise still abounds.

Quality assurance (QA)

QA is basically a management process implemented to enhance confidence in a product or service by consistently achieving previously stated quality objectives set out in writing. Essentially, it is a declaration given to inspire confidence that a particular organization is consistently capable of satisfying the customer's requirements and needs.

Notwithstanding the current technical and contractual framework within which quality functions have both been negotiated and operated successfully to a large extent, it appears that the measures taken therein are still considered inadequate. This has apparently led to the adoption of the QA concept in the construction industry where its proponents have put forth the notion that quality not only has to be achieved, it needs to be assured before the steps towards achievement can even be contemplated.

While appropriate for the manufacturing industry, this concept would seem to require some modifications before it can be applied gainfully for construction activities. From the six building sites studied, most respondents appeared to be ignorant of the efforts made to implement QA into the construction industry. When the concept was explained, respondents who are familiar with the traditional mode of procurement did not appear to be receptive to the idea. As one employer's quantity surveyor commented,

> What you might be saying is that it is something written down. Yeah, being a professional myself, my attitude would probably be that I have been doing that for 30 years, you know. Okay, we haven't got a document, we haven't got anything written down but Christ, you know, this is only common sense! The contract says the builder will construct it in accordance with the design and if it is in any way defective, he will put it right and if he doesn't put it right, he wouldn't get his money. And even if it is something that you can't see that is wrong but because it manifests itself, say, 5 years after it is built, then although the contractor has all his money, you can still go back to him to sue him to make him put it right. That is the only way, I mean, what more do you want?

From the contractor's point of view, it would appear that quality is already built into a project when a large number of inspectors are involved. As a result, it looks as if QA is unnecessary in such circumstances when several people are already in existence to make sure that the contractor is doing exactly what he is supposed to be doing. The site manager on one design-and-build project said,

> The clerk-of-works is the first inspector we have got to satisfy. The building inspector is the second inspector we've got to satisfy. The architect and the consulting engineer come any time to make sure that I am working strictly in accordance with their drawings. So there are four people. There is another clerk-of-works for the electrical and mechanical side. So that is another inspector. Then over and above that, we have got the project coordinator for the client. And then he has got the supervising officer on behalf of the client who actually pays me. And he won't pay me until he is satisfied he has got what I am being paid for.

The expectation of simplicity has, likewise, prevailed. In one clerk-of-works' mind, QA of concrete is analogous to the taking of test cubes. In any case, he reasoned that:

> Quality assurance doesn't come into it a great deal apart from concrete. We have to test cubes. You will specify so many test cubes either each pour of concrete or whatever the case may be and with a bit of luck, get the results back. And I would say 99 times out of a 100 are satisfactory.

This appears to be a mistaken notion because QA does not entail any element of chance left to testing. In QA, the process for eliminating errors and defects is built-in to the producer's system and as such, implies that the users should be confident enough to forgo the need to carry out any testing on their part. Quality management systems, in essence, concentrate on preventive measures rather than corrective action. It would appear that one of the main objectives of QA is to foster a better understanding of what people are required to do correctly for the first time in any system. As one senior QA consultant not involved in any of the six building sites, but none the less interviewed separately, explained,

> One big difficulty is getting people to understand what they have to do in the first place. I think the big trouble in any business is that people don't understand what they have to do and because they don't understand what they have to do, then they sometimes do it right and sometimes do it wrong. And I think that is probably equally true in the construction industry. Maybe even more so because it is more fragmented.

This has perhaps led to the need for written clarifications of what people are required to do and how to do it. It seems that this has also evolved gradually to the situation today where a growing number of clients demand such documentation in order to enhance their confidence in the firm. Another senior quality consultant interviewed has highlighted this trend when he disclosed:

> Now a lot of companies will have to satisfy their customers because the customers have gone to the companies and say: 'You will write down everything that you do, all your systems, all the instructions. Do you have quality manuals? And you will keep records and you will write down all these.' And it means all this paperwork.

The amount of documentation involved in QA appears to be exorbitant. Although a certain amount of paperwork is inevitable in any business, it would seem to promote bureaucracy even further in an organization if used extravagantly, While a certain amount of bureaucracy is acceptable, the same QA consultant has acknowledged that it can be counter productive if it is allowed to prepetuate excessively. Furthermore, it was felt that this might be the reason why certain categories of people have existed to make business and money by creating and propagating more paperwork. In describing his experience to this effect, the quality consultant said,

> I have worked on many projects for XYZ and some in the ABC Offshore Engineering projects. It employs all sorts of quality people and engineers and everything. And they all have to write everything that they were going to do. And indeed, a lot of it was not necessary but it is keeping people their jobs. the client will pay. ABC will pay. XYZ will pay for all these people. But it is not essential for a good job.

A propagation of this nature would seem to accord well with Burns and Staker's (1961) description of a bureaucratic hierarchy where more branches are grown, and where special intermediaries and interpreters, methods engineers and standardization groups, etc., are created. Burns and Stalker (1961) have maintained that a familiar characteristic of this phenomenon exists wherein the first priority:

> is to look for the solution of a problem, especially a problem of communication, in 'bringing somebody in' to deal with it. A new job, or possibly a whole new department, may then be created, which depends for its survival on the perpetuation of the difficulty.

The attempt to introduce QA into the construction industry would, as a result, appear to some as an infringement of well-established orders and practices, disturbing, in the process, a well co-ordinated industrial equilibrium which consists of the technical order, the economic order, the occupational order and the legal order (Seymour and Low, 1990). That QA affects each of these four orders is a truism which hardly needs any further evidence. Construction procedures (i.e. technical order) are modified to a certain extent; so are extra costs incurred (i.e. economic order) and contractual implications (i.e. legal order) deflected accordingly. The occupational order appears to be affected most in so far as flexibility is concerned. The various professionals in their respective disciplines are now subjected to constraints imposed by this extraordinary creature called the 'QA person' who attempts to infringe into their territories. Professional discretion and judgement, con-

ventionally vested in the traditional professions, are now curtailed to some extent within the framework of QA where allowable leeway, if any, are all structured in writing beforehand. It would seem that under such circumstances, the flexibility and manoeuvrability on the part of the independent professions will be restricted in a tremendous way. All said, the power and authority in deciding what task to do, when to do it and how to do it are now transferred to the QA consultant who accordingly dictates and dispatches independent professional judgement in every holistic aspects where QA systems have been implemented. It is doubtful whether such an approach is likely to benefit the construction industry in which every project is unique and every traditional profession would certainly wish to retain some degree of flexibility, independence and autonomy in deciding what is best for dealing with the problems on hand. The traditional framework has been able to cope with the vagaries of construction works given the amount of negotiable leeway each individual profession has all along. While it may be fair to criticize the traditional framework for inexpediency in the context of modern construction, it has to be admitted that it has certainly served the community well in the past and has strived continuously to adapt quickly enough to uphold its convictions. The additional imposition of the QA concept into the industry without taking into due consideration the traditional framework would tend to stifle the occupational order in so far as the various independent professions are concerned.

This is not to suggest that a systematic approach to structuring construction activities along the lines of any QA programmes is of no value to the industry. The field study has, however, revealed a tendency for practitioners to reject the QA approach if they are required to submit themselves to the jurisdiction of some previously drawn-up QA programmes, which limit the exercise of professional and independent judgements. In the process, what seems to be an attractive solution to a problem may in effect create yet other problems at a time when cultivation of the right attitudes in work performance is considerably more important. As a management tool, QA is likely to benefit the industry when construction elements can be systematically dealt with repetitively to a certain extent. Over and above that, it would tend to face veiled resistance and rejection from the more established professions for its intrusive features and difficult boundary-spanning roles.

Conclusion

The life-cycles of construction projects are much longer than those of most other industries. Projects are therefore expected to evolve according to time and circumstances throughout their lifecycles. However, there appears to be a lack of a clear uniform evaluation standard in overall construction quality as can be found in the manufacturing industry. Thus, the quality of construction projects has been evaluated subjectively in many aspects. To overcome this difficulty in definition, some practitioners have resorted to describing quality as satisfying fitness for purpose and conformance to specifications. However, this approach does not delineate nor curb the on-going debate over a definition of quality which is acceptable to all. The industrial framework within which construction quality can be examined is not as simplistic as some practitioners would like it to be. Quality, to many others, is a general term which means different things to different people. The adoption of too simplistic an approach would therefore be both unrealistic and naive. The empirical evidence culled from this field study of six building sites in the West Midlands has tended to support the proposition that there are other more complex phenomena and less deterministic issues of quality in construction. Undoubtedly, this has lent credence to a belief that quality within the bounds of practicalities can be both deterministic and indeterministic at different points in time and under different situations. Hence, in so far as the two tendencies (T1 and T2) posited earlier are concerned, the evidence mirrors a need for the industry to recognize this phenomenon when tackling the task of attaining quality construction.

Finally, despite all the perceived difficulties in understanding and defining what good quality entails, the field study seems to suggest a different scenario. Although the respondents have been unable to define quality offhand, many have implicitly indicated their abilities to recognize good quality when they see it. The respondents do not seem to be perturbed by the difficulties they faced in defining construction quality. It looks as though the ability to recognize good quality or otherwise has already been provided for within the traditional framework of the construction industry. Hence, contrary to popular beliefs, the difficulties faced in documenting quality do not seem to be the main issue. What matters are the precautionary measures taken in response to the awareness or recognition of slipshod construction. Amidst the numerous exhortations attempted by others in putting forth a single meaning and definition of construction quality, the resultant effect does not seem to be useful. The tremendous effort expended in this direction appears to have yielded minimal return except to fuel further debates which seem to be unnecessary in view of the contributions already provided for by the well-accepted traditional framework of the industry. Since such explanations or definitions of construction quality have tended to be repetitive in many ways, it was

felt that any future expositions along those lines should not be encouraged as these are unlikely to be useful.

In conclusion, the fieldwork has shown overwhelming empirical evidence to support the two hypotheses formulated for the study. To reiterate, these are:

1. There are two tendencies (T1 and T2) within the construction industry in so far as the interpretations of quality issues are concerned. While T1 tends to be deterministic and rational, T2 appears to be both situational and less certain in its approach.
2. The attempt to implement QA systems within the construction industry has given rise to resistance from the other more established professions because the traditional balance of occupational order has now been disturbed.

In the long term, it would be strategic for the industry to move towards T1 where clearer guidelines on construction quality may be obtained. Nevertheless, practitioners should immediately recognize the effects of other irrational and indeterministic factors which impinge on T1 when quality standards may be 'negotiated' and ambiguities introduced.

Finally, the T1 concept posited in this paper is akin to Max Weber's theory of the rational-legal organization which, in itself, is questionable on the grounds of differing perceptions, historical backgrounds and the lack of an unquestionable perceptual knowledge on the part of humans. This paper would therefore only be useful if it is able to convince those with a vested interest in maintaining the deterministic (T1) approach to convert to the indeterministic (T2) view. One possible solution to this challenge would be to demonstrate that the rationality required by the seekers of quality using the T1 approach is in itself an irrationality. Hence, any uncritical acceptance of sets of handed down parameters (i.e. rules) without an honest dialogue between the participants aimed at ensuring the client's best interests, is an illogical human act which needs to be avoided. Efforts directed towards the betterment of the established framework within which construction quality functions in the industry should therefore take into consideration both the T1 and T2 tendencies proposed in this paper. Further research work which can help to develop this theme is also essential for the following reasons:

1. As a contribution to the overall labour process debate, and
2. As a foil against the further imposition of unsuitable Taylorist forms of management and organizations in the construction industry.

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