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# ISO 9000 standards: perceptions and experiences in the UK construction industry

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With the adoption by construction firms of BS EN ISO 9000 there has been much debate concerning its effectiveness and value as a quality management system. In spite of the reported benefits of ISO 9000 certification, however, concerns regarding its overall benefit to construction firms due to unnecessary bureaucracy and paperwork, increased costs, stifling of innovation, etc. still persist in the industry. This paper reports on the results of a research carried out on the implementation of BS EN ISO 9000 as a continuation of BS5750 in the UK construction industry from the view point of the experiences and perceptions of quality assurance managers of selected construction firms.

**Keywords:** Quality assurance, quality management systems, ISO 9000 standard, certification, construction firms

## Introduction

The development of ISO 9000 in the United Kingdom has been based on the application and adoption of BS5750 (Ghanbari-Parsa, 1996). In 1979 the British Standards Institution introduced a new set of standards aimed at promoting quality of services and goods provided by different sections of UK industry. This was developed in order to increase the competitiveness of British industry in Europe and international markets. In 1987 a number of countries ratified an agreement recognizing an International Quality System Standard, the ISO 9000 series, which was a direct equivalent of BS5750 (1987). In mid-1994 the ISO 9000 series was revised and developed internationally into BS EN ISO 9000, which is now used in more than 70 countries. The 1994 revisions include some new requirements and clarify some points with specific requirements. The current standards are expected to be reviewed after the year 2000. The new BS EN ISO 9000 reflects the

European (EN) and wider international (ISO) recognition for this series, which was developed originally in the UK and is becoming the basis for the development of quality management systems for ensuring quality assurance in the provision of goods and services on an international scale.

Given continuing concerns regarding achievement of quality in the construction industry and the international recognition and long establishment of ISO 9000 as a continuation of BS5750, firms within the construction industry are increasingly adopting ISO 9000 as the basis for their quality management systems (Bayes, 1993, 1994; Barrett, 1994; Latham, 1994; Doe, 1995; CIRIA, 1996, 1997).

There is, however, a continuing debate as to the suitability of ISO 9000 and formal quality assurance to the particular conditions of the construction industry (Seymour and Low, 1990; Pheng, 1993; Shammastoma *et al.*, 1996). Among other concerns, such systems are seen by these authors to lead to a stifling of initiative, increased confrontation and excess cost and paperwork which, in the end, reduce rather than enhance quality and seem not to bring any other major benefits to the construction firms concerned.

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Apprehensions regarding some of these concerns and the need for further research have been expressed also by government sponsored reports on quality in the construction industry (DOE, 1995). In response to these concerns, this paper examines the effectiveness of quality management systems on the basis of ISO 9000 certification in selected UK construction (contracting) firms.

### Quality assurance and the quality debate

Quality assurance has been defined as 'a structured approach to business management and control, which enhances the ability to consistently provide products and services to specification, programme and cost' (Duncan *et al.*, 1990). In their most strict interpretation, quality assurance and quality management systems must achieve such a consistency in product and service provision by pre-empting mistakes from occurring through ensuring that the right thing is done the first time. At the market level QA may be seen as a mechanism for inspiring confidence in the ability of an organization to meet customer requirements on a consistent basis. It is therefore of no surprise that in an environment where inadequate quality achievement continues to be of concern, in the construction industry many firms have opted for the adoption of quality assurance as a way of improving the quality of their products and their image in the market (CIRIA, 1987, 1996; Latham, 1994; DOE, 1995). This has been particularly evident with respect to obtaining third-party registration for quality assurance to BS 5750/ISO 9000 standard, whereby many firms have either obtained or are working towards obtaining certification (Bayes, 1993, 1994; CIRIA, 1996, 1997).

Nevertheless, in spite of the widespread acceptance of QA and ISO 9000 in the industry some writers have voiced their concerns over the suitability of formal techniques of quality assurance to the construction industry (Seymour and Low, 1990; Pheng, 1993; Shamma-Toma *et al.*, 1996). In this regard it has been argued that the particular characteristics of the construction industry, e.g. fragmentation, separation of design and construction, and relative lack of control over working environment and site conditions, has meant that many aspects of construction work do not lend themselves to quantification and measurement. As a result the definition and achievement of quality must inevitably rely on negotiation, cooperation, compromise and professional judgement between clients representatives, contractors, subcontractors, managers, engineers and workers (Seymour and Low, 1990; Pheng, 1993; Shamma-Toma *et al.*, 1996). Consequently, it seems that QA, particularly in the preva-

lent form of dictates from above, can easily become a tool for asserting the control of those higher up in the chain of command over those lower in the chain, e.g. clients over the main contractor, main contractor over subcontractors, managers and engineers over workers, etc. (Shamma-Toma *et al.*, 1996). This leads to restricted communication between the various parties, an environment of mistrust and additional confrontation and an erosion of professional discretion, power and respect which have been the mainstay for the achievement of quality in the industry thus far by replacing them with formalized systems (Shamma-Toma *et al.*, 1996). All these side effects, it is concluded, will limit the effectiveness of the system in controlling and achieving quality.

Supporters of QA, on the other hand, argue that given the fragmented nature of the construction industry, formalization of communication, training and documentation of all information necessary for the satisfactory implementation and completion of projects is in fact the most effective way of achieving better communication, training, management and consistency of work (Duncan *et al.*, 1990). This would be the case, it is argued, as long as the QA system has been appropriately designed to accommodate the particular requirements of the particular firm and applied in a sensible manner (Duncan *et al.*, 1990). In addition, there are numerous examples of successful applications of QA systems on the basis of ISO 9000 in the professional literature which purportedly have led to increased efficiency, better quality, better management, higher consistency of work and better coordination and understanding between clients and contractors (CB, 1993, 1994; Sims, 1993; Bayes, 1994; Griffiths, 1994; Scott, 1996). More importantly, research by CIRIA in 1993, which covered 35 firms from all the main sections of the industry, i.e. architects, main contractors, specialist and trade contractors, quantity surveyors, consultants, products manufacturers and material suppliers, also found that in spite of some limitations the implementation of quality management systems to BS EN ISO 9000 'can be an effective way of managing quality within firms in the construction industry' (CIRIA, 1996). In spite of the reported benefits of ISO 9000 certification, however, concerns regarding its overall benefit to construction firms due to unnecessary bureaucracy and paperwork, increased costs, stifling of innovation, etc. still persist in the industry. Indeed, both the Latham report and the consultation document of the Construction Liaison Group have highlighted the need for further research on these issues (Latham, 1994; DOE, 1995). The validity of these concerns and the overall effectiveness of formal quality management systems on the basis of ISO 9000 are examined in the remainder of this paper.

## Methodology

Similar to the research carried out by CIRIA and other works on the implementation and effectiveness of quality management systems in the UK construction industry, the adopted methodology for this research was based on a qualitative approach utilizing in-depth case study interviews which were conducted with the quality assurance managers of 12 major UK construction firms (Pheng, 1993; Abdul-Rahman, 1996; CIRIA, 1996; Shammass-Toma *et al.*, 1996). Such an approach was deemed to be particularly suited to the aims and objectives of this research since it was concerned primarily with ascertaining the perceptions and experiences of QA managers in the industry. The most comprehensive way of achieving this was seen to be through face-to-face in-depth interviews, and the study of a limited number of firms rather than studying a larger sample through other methods, such as mail outs, which may have given a larger statistical significance but would have been at a more superficial level. In this regard after an initial review of the literature for identifying the major purported advantages and disadvantages of ISO 9000 QA systems, semi-structured questionnaires were designed to ascertain the degree to which the reported advantages/disadvantages of ISO systems are supported by the reality of the experiences of the managers interviewed.

In the context of this research opinion based surveys, however, may be subject to criticism for being somewhat biased, since the respondents, i.e. QA managers, may be seen to have a self-interest in exaggerating their positive experiences and underplaying their negative ones. To a large degree such biased outcomes can be counteracted through measures such as inclusion of respondents known to have less or no self-interest, careful design of questionnaires, good interview techniques and careful scrutiny of the results including the strength and logic of responses and cross-comparison of the responses from different firms with each other and with other similar research. In this way the significance and impact of biased responses is minimized to such a degree that they will not prejudice the integrity of the research findings.

Identifying and counteracting potential biases have been central to the approach taken in the design, implementation, analysis and output of this research. In the case of firms 6, 8 and 9, for example, interviews were actually carried out with the managing surveyor, general manager and senior design manager of these firms, respectively, who had a high degree of involvement in formulating the QA system and policy of their firms, and can therefore be considered to have minimum self-interest in terms of biased responses. Moreover, the other interviewed managers were all

experienced construction professionals, i.e. civil engineers, quantity surveyors, architects and chartered builders, most of whom had extensive experience in project management but had taken over as QA managers. As a result it may be stated that the respondents of this research were well placed for assessing the suitability of the adopted ISO QA systems against the realities of construction work.

The main criteria for choosing the firms for interview, however, were certification for ISO 9000 and the acceptance by QA managers to be interviewed. In addition, as this research is part of a joint activity with the Hokkaido University in Japan, four UK subsidiaries of major Japanese firms also were included in the study (Ghanbari-Parsa *et al.*, 1998). Overall, the case studies represent a range of firms/divisions in terms of size and field of work.

## Profile of firms and their QA procedures

As shown in Table 1, firms 1 and 11 represent the civil engineering divisions of two major firms, firms 2–6 and 12 represent either divisions or firms involved in general construction work, and finally firms 7–10 are smaller UK subsidiaries of major Japanese firms specializing mainly in design and build in construction and general building work for Japanese and other customers. The size of the firms in terms of the number of employees was about 50–100 for the smaller UK subsidiaries of Japanese firms to 25 000 for the largest interviewed firm. The remainder of the firms had 700–2800 employees.

The QA managers of all firms were experienced professionals from different fields of the construction industry, particularly civil engineering. Moreover, existing internal personnel had played the major role in formulating the ISO quality system of all the firms interviewed. Indeed, only one firm had recruited a new quality manager, although four others had recruited external consultants to help with the planning of the system. The remaining firms had relied entirely on their internal personnel for formulation of their quality systems and strategies. This was due to the recognition of the fact that only the people who already had first-hand experience and an extensive knowledge of the work culture, procedures and requirements of the firms would know what would be the most suitable system for the firms concerned. The QA manager of firm 3, for example, commented 'with the internal process more mistakes are made but the end result is more suited to the requirement of the company'.

The comment of the quality auditor of firm 6 is representative of the general attitude of the interviewed

**Table 1** Number, field of work and background of interviewed managers

Firm No.	Field of work	Type and year of ISO certification	Background of QA manager
1	Civil engineering	ISO 9002 1993	Chartered civil engineer
2	Construction	ISO 9001 1993	Structural engineer
3	Construction	ISO 9001 1994	Chartered civil engineer
4	Construction	ISO 9001 1993	Civil engineer
5	Construction	ISO 9001 1993	Chartered builder
6	Construction	ISO 9002 1993	Chartered quantity surveyor
7	Construction/general building	ISO 9001 1996	Chartered quantity surveyor
8	Construction/general building	ISO 9001 1997	Chartered civil engineer
9	Construction/general building	ISO 9001 1996	Senior architect
10	Construction/general building	ISO 9002 1993	Quantity surveyor
11	Civil engineering	ISO 9002 1992	Chartered civil engineer
12	Construction	ISO 9001 1995	Chartered builder

managers in this regard. He stated: 'Providing a company is large enough and has competent people to write the quality manual then it should be done internally because they know their own business better than external consultants'. The importance of having an experienced professional from within the industry to run their quality management system for interviewed firms is also highlighted by the experience of firm 12, which originally had employed a professional quality consultant as their QA manager. However, they had soon realized that his knowledge of construction was inadequate for applying the system in their firm and had changed him after only 9 months and employed a professional builder and experienced project manager as their QA manager. The professional background of the QA managers, the high degree of involvement of existing professional personnel in formulating the quality systems of all the interviewed firms, and the general awareness of the managers with regard to the necessity of having the internal professional input, together go a long way towards countering concerns by the critics of formal QA, with respect to the imposition of systems by outside QA consultants, who may not have adequate knowledge of the intricacies and realities of construction work and culture (Shammas-Toma *et al.*, 1996). Moreover, apart from firm 11 all the firms had conducted training sessions for their existing personnel and had training procedures for new recruits. In addition, three managers stated that they hold regular training at the beginning of all projects, regularly visit sites, and further training is provided if it is deemed to be required. Finally, another three firms also used external consultants to train their quality auditors. Evidence from the aforementioned CIRIA research shows that the priority given to the involvement of internal personnel in the formulation and implementation of quality management systems and training is shared in the other sectors of the industry as well. Indeed, while 23 firms (66%) of the CIRIA

cases had used the services of an external consultant 20 firms (57%) had actively involved their employees in the formation of their QMS and a further 3 had consulted their employees prior to implementation (CIRIA, 1996). Moreover, a majority had also held in-house training sessions, seminars or discussions (CIRIA, 1996). These results are corroborated also by SERC sponsored research which showed that 86% of around 150 QA certified firms which had responded to the research survey had used only their own staff to develop their quality manual and procedures (Barrett, 1994).

The type of ISO certification, on the other hand, relates to the scope of the work of the firms with regard to inclusion of permanent work design. Consequently, firms which have a major component of such design work have registered for ISO 9001 certification, while firms mainly involved in contracting have opted for ISO 9002, which does not include design of permanent works. The date of certification of most UK firms is during 1993 and 1994, which is a reflection of the widespread acceptance of third party registration for ISO 9000 standard series in the industry at the beginning of 1990s, leading to certification in the mid 1990s. It should be noted, however, that this does not mean that prior to the 1990s the firms interviewed were not concerned with QA. Indeed, by the mid 1980s all firms interviewed already had a formal QA system either based on the earlier version of BS5750 or their own in-house quality procedures. The choice of the certification authority depended largely on the past experiences and contacts of the firms with the related authorities and recommendations by other contractors. The majority, or seven firms, had chosen BSI, three the Lloyds register and two SGS Yarsley as their certification authority. In addition to the above reasons the reputation of BSI as being the largest and most established certification authority seems to have played a major role in them being chosen by the majority of the

firms. All but firm 11 were satisfied with their chosen authorities. It should be noted that the dissatisfaction of firm 11 extended to the entire ISO procedure, which they considered to have negatively affected their activities. This will be explained further in the latter parts of this paper.

### Reasons for adoption of ISO 9000

Recent research carried out by Shammas-Toma *et al.* (1996) indicates that client requirement is the main reason for the adoption of QA systems by construction firms in the UK rather than a belief in the value of such systems. The results of the present research show that this view can be considered to be correct only in as much as customer requirement has a high ranking with most of the interviewed managers for their move to ISO certification. At the same time, however, other factors pertaining to the inherent value of QA systems have played a major and in some cases more important role. As shown in Table 2, improving quality of management and services had been a more important consideration for firms 4, 5, 9, 10 and 12 than customer requirement. Moreover, the explanations of the interviewed managers show that although customer requirement was indeed the initial main drive for ISO certification, other issues, particularly improving the quality of management and working practices and ensuring continued customer satisfaction, had become more dominant. The manager of firm 1, for example, added a further factor to the list with regard to ensuring the continuation of quality products with an allotted highest ranking and stated: 'Up to this point the view has been to set up a system for producing and keeping records. Whereas the new perspective requires what effect the system has on the product and working practices'. Similarly the manager of firm 2 explained that

at the time of going for ISO certification the only real reason was customer requirement. However, after running the system for over three years they were now looking for major improvements in their management and working practices through a revised system, rather than simply having something to show their clients. The manager of firm 3 also noted that 'at the initial period customer requirement was the main reason but now it has become the inherent benefits of quality management'. The interviewed QA manager of firm 7 and managing director of firm 8 noted also that their head offices were originally primarily concerned with customer requirement but that they personally considered improvements in the quality of services, products and management to be the priority for ISO certification. These explanatory comments show clearly that at least at the management level construction firms have recognized the possibility of obtaining, and are in fact demanding, much more from their QA systems and ISO certification than simply meeting client requirement on paper. These explanations show also that managers expect to be more consistent in ensuring the continuation of the quality of their products as a result of their ISO certification. However, Table 2 shows that, in the main, improvements in the quality of products was not a major reason for the adoption of ISO certification. This is due mainly to the belief by the interviewed managers that they were already producing their products to the highest possible quality, and the main task of their QA system would be to ensure that this continues in the future.

Table 2 shows also that marketing advantage, competitive edge and enhancement of sales/profits also have had high or medium importance for about half of the interviewed managers. However, as the QA manager of firm 3 pointed out, these factors are becoming increasingly less relevant due to the prevalence of certification in the industry. Improving

**Table 2** Reasons and ranking for adoption of ISO 9000<sup>a</sup>

Main reasons	Firm No.											
	1	2	3	4	5	6	7 <sup>b</sup>	8 <sup>b</sup>	9 <sup>b</sup>	10 <sup>b</sup>	11	12
Customer requirement	3	3	3	1	1	3	3	3	2	1	3	2
Improving quality of management	2	2	2	3	2	1	1	3	3	2	1	3
Improving quality of services	2	2	2	3	2	2	1	2	3	3	1	3
Improving quality of products	1	2	1	1	2	2	1	3	2	2	1	1
Improving customer satisfaction	2	2	2	2	3	3	3	2	3	1	1	2
Improving productivity	1	2	1	3	1	1	1	2	1	3	1	1
Marketing advantage	3	3	1	1	3	3	2	1	2	2	3	1
Maintaining competitive edge	2	3	1	2	3	3	2	2	1	3	1	1
Enhancing sales/profits	1	3	1	3	1	2	3	2	1	1	1	2

<sup>a</sup>Ranking is in order 1–3, where 1 is least and 3 most important.

<sup>b</sup>Subsidiaries of Japanese firms.

productivity, however, seems to have had the lowest importance among the interviewed firms, with the majority of the firms giving it low ranking. These results are to some degree contrary to the findings of the CIRIA research, where 30 firms (86%) indicated that marketing advantage had been the main reason for obtaining third-party certification to BS5750. This was particularly the case for the main contractors and material suppliers. On the other hand only five firms, architects and consulting engineers had sought to improve their management controls. The results from the aforementioned SERC sponsored research shows also that only 33% of around 150 firms responding to their survey had adopted QA for overhauling their management practices, while another 35% and 29%, respectively, had given 'marketing tool' and 'keeping existing clients' as main reasons for adopting their systems (Barrett, 1994). It is interesting to note that a survey of the clients in the above research showed that only 2.9% demanded a quality management system as a pre-requisite to employment (Barrett, 1994). None of the clients, on the other hand, required BS5750 certification Barrett, 1994). This again supports the conclusion from this research on the lower significance of client pressure for QA certification to ISO 9000 than that implied by Shammas-Toma *et al.* (1996).

The difference between the CIRIA research and the results of this work with respect to the importance of ISO 9000 certification for marketing advantage may be explained by the fact that the CIRIA research had concentrated on the firms who had obtained certification prior to 1991, when a certified quality management system would have been relatively rare in the industry and of definite marketing advantage. Moreover, the results of this research point also to a maturing and shift of focus in the contracting side of the industry towards using their quality systems for improving their management practices and quality

procedures, rather than simply as a marketing tool. The results of the CIRIA research, nevertheless, support the results of this research with respect to client pressure since only 2 of their 35 cases, including 1 main contractor out of 5 studied, had installed their systems due to client pressure.

Finally, Table 2 indicates that there is no discernible pattern as to the difference in reasons for adoption of ISO 9000 between UK and Japanese owned firms as two separate groups. Indeed, there seems to be as much difference on this issue within the respective groups of companies as there is between them. It should be noted, however, that this research was not designed for the detailed identification of differences in perception between the two groups. Rather, it has treated the Japanese subsidiaries as part of the UK construction industry. Consequently, the research can offer only tentative conclusions as to the above differences, which must be checked against the results of other research more dedicated to this purpose.

### Impact of ISO certification

The above conclusion on the wider benefits of ISO certified systems for construction firms is supported by the findings on the impact of ISO certification on the firms interviewed. As shown in Table 3, the most important result of ISO certification for the firms interviewed has been better management practices and structure. Moreover, most of the managers interviewed added that a major result of the certification process, which required in-depth review of the working and management processes, rather than certification itself, was the raising of consciousness on quality issues among personnel, particularly at management level. This was followed by increased customer satisfaction which would be an expected result of certification and improved management and service provision.

**Table 3** Impact of ISO certification<sup>a</sup>

Main impacts	Firm No.											
	1	2	3	4	5	6	7	8 <sup>b</sup>	9	10	11	12
Retaining business	3	3	2	1	2	1	1	3	1	2	2	1
Less failure of work	1	2	1	2	1	2	2	2	2	3	1	2
Better management	2	2	3	3	2	3	3	3	3	3	2	2
Increased customer satisfaction	2	2	2	1	3	3	2	3	3	2	1	2
Less wastage on site	1	2	1	1	1	2	1	2	1	1	1	2
Less delay in project completion	1	2	1	2	1	1	1	2	2	1	1	1
Enhanced sales	2	2	1	1	3	1	1	2	1	2	1	2
Gaining entry into new markets	1	2	1	2	3	1	2	2	1	2	1	3

<sup>a</sup>Ranking is in order 1–3, where 1 is least and 3 most important.

<sup>b</sup>Firm 8 had carried out all the preparations for gaining ISO certification and were hoping to obtain it in autumn 1997. Consequently, the ranking on the impact of ISO certification by the manager of this firm refers to expected rather than actual impact.

It is interesting to note that most managers interviewed did not give high ranking to retaining business, which should have been the case, given that customer requirement was given to be one of the main reasons for adopting the system in the first place. This can be explained by the fact that most of the managers thought that the main reason for them retaining their clients was due to their reputation, existing good quality of work and the long term relationship that they had built up with many of their clients.

Moreover, while many clients increasingly require ISO certification, it is by no means a universal or mandatory requirement. Practically all managers confirmed the requirement for ISO certification varies according to the type of client. Thus although the Ministry of Defence, the London Underground, and the nuclear industry require certification, many other private or public clients do not. Moreover, firms 7, 8, 9 and 10 worked mainly for Japanese clients in the UK which did not require ISO certification. Consequently, the perceived impact of the system for retaining their client base was mostly deemed to be medium to low.

To a large degree the above reasoning explains the medium to low scoring for enhanced sale and entry into new markets. In addition, however, most managers explained that their firms were unlikely to seek new markets away from their present fields of activity. Consequently, they did not see it as being that important to their work. Nevertheless, the QA manager of firm 1 explained that recently they had won a contract in the nuclear industry which would have been impossible in the absence of ISO registration. Similarly, the QA manager of firm 12 also gave a high ranking to gaining entry into new markets, since they had carried out work for government departments where ISO certification was required, and without it they would have had more difficulty getting the contracts. This suggests that ISO certification has great potential for allowing diversification of the activities of construction firms into new areas and markets if they choose to do so, or at least increasing their business opportunities in general.

The perceived impact of the system on the other factors, i.e. work failure, wastage and delays in project completion, was seen to have medium to low importance. This shows that while the ISO certified QA system has brought about some improvements in these areas, the previous systems were relatively adequate in meeting these requirements.

These results in the main support the results of the CIRIA research with respect to the experiences of the main contractors. Moreover, the CIRIA research shows that in the main the same applies also to the other sectors of the industry with some variations, particularly in the area of increased opportunities in the market and enhanced sales where firms in the other sectors had had a much more positive experience than the main contractors (CIRIA, 1996).

### Negative effects of ISO certification

As shown in Table 4, the results of this research show that in relation to the perceptions and experiences of the managers interviewed, concerns with respect to the stifling of innovation and having no beneficial effects (improvement) to construction firms are largely unfounded. However, Table 4 shows also that concerns in the areas of bureaucracy, cost, time consumption and interpretation may have some justification, since about half of the managers interviewed have given them medium to high ranking. The research carried out by CIRIA also shows that the vast majority of the cases they studied had expected and incurred significant increases in paperwork and administrative costs (CIRIA, 1996). Nevertheless, except for firm 11, none of the respondents of this research thought that the negative effects were to such a degree that they would offset the beneficial effects of the registration system.

Moreover, the explanations of the managers interviewed shows that the highly ranked negative effects of the ISO system are due mainly either to teething problems of putting a new system in place or inappropriate formulation and application of the system,

**Table 4** Negative effects of ISO certification<sup>a</sup>

Areas of concern	Firm No.											
	1	2	3	4	5	6	7	8	9	10	11	12
More bureaucracy	1	3	1	1	2	3	1	1	2	1	3	1
Added cost	2	2	2	1	1	3	3	1	3	1	3	1
Lack of innovation	1	2	1	1	1	1	2	1	1	1	3	1
No improvement	1	3	1	2	1	1	1	1	1	1	3	1
Time consuming	2	3	1	1	2	2	2	3	3	1	3	2
Superficial and variable interpretation	3	3	1	1	1	3	2	2	1	2	3	1

<sup>a</sup>Ranking is in order 1–3, where 1 is least and 3 most important.



rather than an inherent problem with ISO certified QA systems. The experience of firm 2 can serve as a case in point. The QA manager of this firm explained that ISO registration had not delivered more than their previous system. Hence the high to medium negative ranking given to all areas of concern by this manager. Consequently, they had undertaken a complete review of their ISO system, which had just been completed, and had come to the conclusion that they had completely misunderstood the ISO system and thus had failed to get the best out of it. In their review they had identified problems with lack of proper understanding and commitment to the system at the project manager level, departmental rivalry and lack of feedback and communication between them, such as communications between the maintenance department and project managers, and requirements for highly excessive paperwork. They now realized that under their revised ISO system which had just been renewed they could deal with all the problems areas identified and achieve much better management and working practices with a fraction of the previous paperwork. Their aim, the QA manager explained, was negligible negative side-effects and high improvements in all the beneficial areas raised in Table 3. The manager of this firm explained: 'The biggest drawback was that it was not really geared to the construction industry. However, it gave the opportunity to look at the management system and compare it with the requirements of ISO. It can, however, be a bit too rigid since construction is not a production line activity. That is why [the firm] is changing its management structure to introduce and include flexibility into the system. Since the restructuring and re-analysing, the response of project managers to the new system has been very positive'.

As already stated, firm 11 was the only firm which had had a completely negative experience with ISO certification. Indeed, the perceived experiences of this firm provide strong evidence in support of the arguments of the opponents of ISO 9000 and formal quality management systems in general. This is to the extent that the business improvement manager of this firm added 'actual reduction of quality of workmanship' with an allotted highest ranking to the negative effects of ISO certification. The interviewed manager of this firm explained: 'The procedures and specifications won't get quality right. It is the attitude of the people on the ground that is important. The problem with having procedures is that when you keep having instructions from above you stop people thinking and in the long run you lose. The best quality sheet is a blank one where the operative has to fill it in himself and get it signed. Make the operative think'. He then continued: 'If you focus on applying ISO 9000 you

lose out on the business. If you focus on the business [get the business right, do it properly and effectively] then you automatically get 95% of ISO 9000'. The interviewed manager of firm 11 then went on to explain that while keeping ISO 9000 for marketing purposes, they have now moved on from it and were involved heavily in benchmarking as their chosen method for guiding their overall business improvement, including quality, since this was much more productive and compatible with their philosophy of gaining quality through operative awareness and empowerment.

There is of course nothing wrong with the above statements in themselves and much to commend the above attitude in terms of getting quality through 'getting the business right' and empowering the operatives. The question is whether or not quality management systems based on ISO 9000 are as detrimental to operative initiative as that indicated by the experience of firm 11, without any saving graces to make up for some formality that it introduces? The evidence from the other interviewed firms indicates that they are not. In addition the research did not find any contradictions between the concurrent application of ISO 9000 standards series and embracing other methods of quality management such as total quality management (TQM) and benchmarking. Indeed, while some managers thought that it would be difficult to apply TQM to the construction industry due to the scale of changes required, except firm 11, none of the managers thought there was any contradiction between ISO 9000 and these other methods. Indeed some firms were already involved in some of the other methods at the same time as applying ISO 9000. The QA manager of firm 12, for example, who was one of the most enthusiastic supporters of ISO 9000, explained that the whole working culture of their firm was based on the principle of TQM, and the QA manager of firm 5 commented that in addition to ISO 9000 they were involved in benchmarking and investment in people (IIP). Furthermore, several other managers stated that ISO 9000 had provided the foundation and consciousness for moving on to TQM and benchmarking in the future.

Moreover, further explanations and comments of the interviewed manager of firm 11, shows that while their negative experience with ISO 9000 seems to have irrevocably damaged their confidence in such systems, it was in fact their incorrect interpretation and hastily formulated and inappropriate procedures which created their problems, rather than ISO 9000. The manager went on to acknowledge: 'A main reason for the negative experience was that the procedures for accreditation were done too quickly. It took only 9 months for the entire £400 million company. It was done too quickly without proper consideration of what

was relevant and needed. We knew BSI were looking for procedures so we wrote them. We knew they were looking for checklists so we devised them, without considering what was really appropriate to quality'.

It should be noted that, in addition to accepting that they themselves had approached ISO 9000 certification incorrectly, the interviewed manager of firm 11 also put much of the blame on the shoulders of their accreditation authority for providing them with the wrong advice, since they had been told to specify and check practically every procedure of their work in order to obtain certification. This he identified as the traditional approach which was creating major problems with ISO 9000. The experiences of firm 2 and the other firms interviewed suggests that an over bureaucratic, costly and inhibitive QM system which is based on ISO 9000 is in fact the wrong system for the company concerned, which can and must be put right. The interviewed manager of firm 12, for example, explained that 'if it is bureaucratic the system is wrong and must be put right. It is not the fault of ISO it is the fault of your system'. Similarly the QA manager of firm 10 stated: 'The standards are also open to variable interpretation because they are not written specifically for the building industry. So you can easily get yourself tied in a knot. However, you can iron this out through the quality procedures, through the right interpretation'.

### **A further measure of control on the impact of ISO 9000**

As a further measure of control for obtaining the impact of ISO 9000 registration on the selected firms, the managers interviewed were asked to rate the relative importance of ten items which were deemed to be important for achieving quality in construction and then rank the improvements gained in these areas as a result of ISO certification. These items were as follows:

- Manual.* To have a manual which describes the objective and method of achieving it in detail.
- Staff.* To employ reliable and appropriate persons, goods, services and organizations and to make appropriate assessments and inspections.
- Organization.* To constitute a reasonable and effective organization.
- Confirmation of contract contents.* To clarify and confirm the contents of a contract.
- Responsibilities and rights.* For individuals to recognize their roles, i.e. to clarify responsibilities and rights.

*Delivery of information.* To make delivery of information from person to person, department to department and with clients, etc., smooth.

*Internal audit.* To check and assess internally whether each individual or organization is dealing accurately with their work.

*External audit.* To check and assess by an outside organization or a group whether each individual or organization is dealing accurately with their work.

*Enlightenment and education.* To enhance staff/organization's interest in quality through education.

*Documentation.* To record the contents of contracts, instructions and inspections as solid evidence of execution.

It should be noted that, except for firm 11, all managers stated that all the items selected were highly important for achieving and improving quality in their firms. However, if forced to choose between them the result would be as shown in Table 5. In order to compel the managers interviewed to choose between the items they were asked to rank each item by allocating points between 0 and 10. However, the total points given by each manager to all the ten items could not exceed 50. Consequently, the average point had to be 5 and according to the importance of each item points were added or subtracted to make the total 50. Table 5 shows that there was clear consensus between the vast majority of the managers interviewed on the importance of reliable staff, responsibilities and rights and delivery of information. These were followed by organization, enlightenment and education, internal audit, documentation and manual, which also received average and above average ranking by the majority of the managers interviewed. Finally, while confirmation of contract documents was seen to have average importance there was clear consensus on the lack of importance of external audit for quality purposes by the majority of the managers interviewed. It should be noted that an external audit is normally carried out at least twice a year by the certification authority on a random audit.

More important for the purposes of this paper, however, is the impact of the application of ISO 9000 standard series by the firms on the above-mentioned factors. As shown in Table 6, there have been medium to high improvements in all the selected items with most of the firms. As would be expected with ISO 9000, with its emphasis on and requirements for documentation and regular audits, the highest improvements have occurred in the quality manual and internal audits, where most firms reported high improvement and only one firm reported low improvement in each case. Indeed, all the firms interviewed undertook

departmental and project audits at least once a year, with some firms undertaking project audits at least twice or even four times a year if they lasted more than one year.

It is useful to note that the business improvement manager of firm 11 had a negative view of the traditional approach to auditing. He stated: 'The training and approach of auditors is negative, which within itself leads to a reduction of quality. [This is] because auditors have to only pick up things that have gone wrong. This leads to resentment and hiding of problems which damages quality. It creates a reluctance to open up'. He went on: 'People can conduct audits positively but should not use the term auditing and should have the right people with the knowledge to do it, not the QA manager who cannot know everything. So let the people who do the job also do their auditing as well'.

Needless to say that the other managers interviewed did not agree with the views of the business improvement manager of firm 11. In fact most managers pointed out that their firms had specifically chosen experienced project managers so that they would have

adequate knowledge of construction work to enable them to do their job effectively. This is highlighted by the case of firm 12 which had in fact changed its QA manager after only 9 months for exactly this reason. In addition most firms had trained other senior project managers and surveyors as auditors to assist the QA managers in the auditing process. Consequently, it may be stated that to a large degree the other cases studied were aware of this problem and had devised mechanisms to overcome it. Nevertheless, there is a valid point to the views of the business improvement manager of firm 11 with respect to auditors having the right attitude and adequate knowledge of the work they are auditing in order to nurture an environment which promotes cooperation with the operatives rather than being conflictive. This, however, is a problem of attitude and culture which can and should be achieved as an essential part of quality management systems based on ISO 9000.

Significantly, most firms also reported at least medium, and a few firms high, improvement with respect to their staff, responsibilities and rights, and

**Table 5** Relative importance of ten selected items to quality in construction<sup>a</sup>

Selected items of importance to quality in construction	Firm No.											
	1	2	3	4	5	6	7	8	9	10	11	12
Manual	0	5	8	3	8	4	3	5	5	5	0	5
Staff	9	6	8	7	5	7	6	7	3	6	10	9
Organization	5	5	4	6	5	4	5	8	5	5	10	5
Confirmation of contract contents	3	5	3	4	4	6	5	1	8	7	0	1
Responsibilities and rights	6	6	5	7	5	7	5	5	8	6	10	1
Delivery of information	7	6	4	8	4	6	5	2	8	4	10	9
Internal audit	5	6	6	4	6	5	7	3	3	4	0	5
External audit	5	0	2	1	3	3	4	4	2	4	0	1
Enlightenment and education	2	6	6	6	6	4	5	9	3	3	10	9
Documentation	8	5	4	4	4	4	5	6	5	6	0	5

<sup>a</sup>These are ranked by allocation of points between 0 and 10, where 0 is minimum and 10 maximum.

**Table 6** Improvements in ten selected items of importance to quality in construction as a result of ISO 9000<sup>a</sup>

Selected items of importance to quality in construction	Firm No.											
	1	2	3	4	5	6	7	8	9	10	11	12
Manual	3	3	3	3	2	1	3	2	2	3	1	3
Staff	2	2	2	2	2	3	2	3	2	3	2	3
Organization	1	2	2	2	2	1	2	3	3	2	1	1
Confirmation of contract contents	1	1	2	1	2	2	3	2	3	1	1	2
Responsibilities and rights	2	2	2	3	1	3	2	2	2	3	2	3
Delivery of information	1	2	2	2	1	2	2	2	3	1	2	3
Internal audit	3	3	3	2	2	3	3	2	1	3	1	3
External audit	2	2	3	2	1	1	2	2	1	2	1	3
Enlightenment and education	1	2	2	2	1	2	2	3	1	2	2	2
Documentation	2	2	2	2	2	2	3	2	2	2	1	3

<sup>a</sup>Ranking is in order 1–3, where 1 is least and 3 most important.

delivery of information which were respectively deemed to have the highest relative importance for securing and improving quality. Moreover, the CIRIA research shows also that all of the cases they studied across all the main sectors of the industry had gained significant improvements with respect to information flow and clarification of responsibilities. The experiences of the firms with respect to the other 8 items were not tested in the CIRIA research. Given the right interpretation and commitment the potential improvements in the latter issues can be seen better by considering the experience of firm 9, whose manager explained: 'The main advantage of the system is that people know what they [quality objectives] are and what is to be done. The registration also forced all the different departments [within the company] to sit together and talk about their own work and its relationship to the company's overall work and aims and objectives. This process was extremely helpful in getting people together so that they got to know each other and about the company's work. For example, people in the accounts were very good in their own work but did not know anything about, and could not relate to, the company's work in terms of design and construction. This lack of knowledge was rectified through this process'.

### **ISO 9000: a tool not a panacea**

The analysis thus far has shown that the adoption and application of ISO 9000 standard series by the firms interviewed has had, on the whole, very positive results for the firms concerned. This supports the experiences outlined by several QA managers of other UK construction firms, and others, in the professional literature (CB, 1993, 1994; Sims, 1993; Bayes, 1994; Griffiths, 1994; Scott, 1996). Nevertheless, as the experience of firms 2 and 11 has already shown, ISO registration in itself does not lead to a more efficient quality system. Rather, it is the correct interpretation, formulation and implementation of ISO procedures according to the specific requirements of the particular firm which yields the expected output and result. This point was widely acknowledged and emphasized by the individual managers interviewed. The QA manager of firm 9, for example, explained: 'People forget that the ISO system is only a management tool and does not solve the problems by itself, and you still have to get the ideas and put them across effectively. There is perhaps too much emphasis to see if you have the registration or not, rather than the type of system you have and how it achieves the objectives. People should know what it is you are doing and how it is accomplished'. Similarly, the manager of firm 8 stated that ISO 9000 'is a tool and as such it is invaluable but should not

be made the master since it will take too much paperwork and become a means to itself'. The QA manager of firm 3 also expressed his concern with regard to avoiding stifling procedures and over-bureaucratic paperwork in the following way: 'Originally BS 5750 said you must have procedures but it did not want written ones. ISO, however, wants written procedures but it does not say what the detail [of the written procedures] should be and it is not always necessary. If there are alternative ways of doing it leave it open and up to the people who are doing the job'.

The QA manager of firm 10 also stated: 'You must use it [the ISO 9000 standard] to reflect accurately what you do. . . . In other words adopt the standards to what you do rather than what you do to the standards. For example, calibration procedures and certificates: the standard says you should have procedures and documentation for this if it is applicable to your work, which in the case of construction it is not'. Similar concerns were expressed in one form or another by all the managers interviewed including that of firm 4 who regarded the ISO standard as laying down the minimum foundation for achievement of quality which must be built upon by the firms to ensure that it stays relevant for the future. In this respect the experience of firms 2 and 11 perhaps is the most poignant reminder of the limitations of ISO system when incorrectly interpreted. Yet the experience of firm 2 on the need for the re-evaluation of their interpretation of the ISO system and necessary adjustment to their management structure is a reminder too of the potential of the ISO system for improving the management system and working practices of firms in the process of achieving and maintaining quality in construction, when correctly adapted to the particular requirements of the firms concerned.

### **Conclusion**

This paper has shown that as far as the experiences of the managers interviewed are concerned, the ISO 9000 standards series can form and has formed the basis for an efficient and advantageous quality management system in the construction industry. In this respect several ISO procedures and requirements have proved to be highly advantageous to the firms concerned. Of particular importance are the reviews required for the initial registration, the requirement for regular internal audits during the registered period, and reviews carried out for renewing registration. These procedures allow weaknesses to be highlighted, and the system adapted to gain the best result with regard to the particular situation and culture of each firm.

Moreover, as the experiences of firms 2 and 9 have

exemplified, the requirement for the comprehensive review and inclusion of all aspects of work, rather than being concerned solely with the physical product, has led to raising consciousness on quality issues across all departments, including administration and accounts. To this must be added better coordination and feedback between departments, particularly those concerned with the planning, construction and maintenance of projects. Consequently, not only is there the potential for achieving and maintaining quality of product but also for creating a much more efficient management and administrative system right across the entire structure of the firms concerned. Nevertheless, as with any formal QA system, ISO 9000 has inevitably involved some additional costs and paperwork. The issue, however, should be whether these are justifiable by the improvements gained. The overwhelming finding of this research is that in the case of ISO 9000 this is indeed the case.

On a more cautious note, and perhaps more importantly, this paper has highlighted the fact that ISO 9000 is only a tool which must be used in a sensible and proper manner. As the experience of firm 2 has shown, this requires that ISO standards and their requirements are first understood correctly and then adapted and applied in a sensible manner in accordance with the actual needs of each particular firm. For example, although ISO has requirements for written procedures and auditing it does not specify the detail and intervals between the audits. These are left to the particular condition of each firm. Consequently, one must not fall into the trap of assuming registration requires that practically everything is prescribed and documented. In this respect the QA manager of firm 2 commented that they were actually surprised when their revised QA system was accepted, and even commended, first time, even though they had drastically reduced the detail and paperwork of the checking procedures. In the words of the manager of firm 3, if there are alternative ways of doing things leave it open and up to the people who are doing the job. To a large degree this approach can deal also with the problem of too much rigidity and with checking requirements, which were deemed to be inappropriate in the context of construction, due to lack of flexibility, by three of the managers interviewed; also there was the totally negative experience of firm 11.

The need for the correct interpretation of the standards, however, also highlight the greatest potential failure of ISO 9000 in that its broad nature leaves it open to misinterpretation, which can have severe negative results for the firm concerned and backlash against ISO 9000 itself, as highlighted by the case of firm 11. There seems, therefore, to be a continuing need for further education and wider dissemination of infor-

mation on the application of ISO 9000 to the construction industry, with particular attention to the dangers of over bureaucratic and unnecessary checking and documenting procedures, in order to overcome this potential weakness. In addition, such efforts should aim to promote a more cooperative and supportive role by quality auditors and QA managers.

Nevertheless, while being limited by its lack of input from site operatives and project managers, a major implication of the findings of this research for the general quality debate in construction is that, as far as ISO 9000 is concerned, the benefits of a formal QA system which is correctly understood, appropriately designed and well implemented far outweigh any negative side-effects.

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