

DESIGN AND BUILD DEFINED

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Design and build as a method of procurement is a fundamental change in the concept of procuring buildings compared with the traditional methods. It places the responsibilities for both design and construction on to the contracting side of the industry, i.e. the main contractor. It obtained recognition from the Joint Contracts Tribunal in 1981 with the publication of the JCT Standard Form of Building Contract with Contractor's Design (CD 81). This recognition was met by change in the British architects and chartered surveyors codes of practice which allowed their members to become full partners and to take up senior appointments in design and build firms. These were clear signs that design and build is now a respectable and sensible way of procuring buildings. This paper defines design and build. The emergence, growth, performance, advantages and limitations of the design and build method of procurement are also discussed. The different varieties of design and build, the attitudes of the professions and the future of design and build are also a feature of this paper.

Keywords: design and build, performance.

INTRODUCTION: BACKGROUND TO CHANGE

Following the Emmerson report, 1962, the U.K. Construction Industry has witnessed a growing trend away from the traditional forms of procuring contracts to other relatively new forms (Franks, 1990b, 1992; Griffith, 1989; Swanoton, 1990; and Torrance, 1992). There are a number of contributing factors to this decline in traditional forms of contract, the increasing complexity of buildings; the need for greater degree of financial planning; the need to reduce design and construction periods and the increasing burden of contract administration have brought increasing pressure to find other ways to plan and co-ordinate, in effect to manage, the whole design and construction processes. Furthermore, there is considerable evidence of clients dissatisfaction and widespread disputes and conflicts over apportionment of risks and time overrun of projects, arising from the type of contracts chosen (Flenn, 1992; Clegg, 1992; NEDO, 1991).

These factors contributing to the decline in the traditional forms of contracts are creating constant demand on the construction process to improve the standard and quality of service provided for the industry's clients, not only in terms of time, cost and performance, but also in the administration and procurement. This constant demand created the desire to bring the whole construction process under a single point of control, directly responsible to the client. The construction industry has reacted not only with improved construction techniques and materials, but also with a new contract form known as "The design and build package" (Caddick, 1988).

DESIGN AND BUILD: AN OVERVIEW

Design and build as it is understood today, was discovered by contractors in the early 1960's (Rowlinson, 1988), when a number of building contractors began to offer the package deal. This was the popular name of design and build, reflecting the concept that contractors offered clients a complete "package", in contrast to the comparatively fragmented traditional arrangements, whereby clients have separate agreements with a team of consultants and a contractor.

Design and build brings a new dimension to building procurement in that it is structured, primarily in the interests of the client, towards giving him/her an improved deal and with far greater emphasis upon the client obtaining better value for money. It provides the necessary multi-disciplinary approach and integration because it forms a designer-contractor team at an early stage in the process, and thus, it vests authority, and so responsibility, for both the design and construction with one organisation, the contracting side of the industry, from initial briefing to the production of the finished building (The Tavistock Institute, 1996; Rowlinson, 1988; Rowlinson, 1987; Griffith, 1989; Torrance, 1992; Franks, 1990a; Franks, 1993; Janssens, 1991; Franks, 1982; Ndekugri and Turner, 1994; and Turner, 1986). This single point responsibility, which distinguishes this form of procurement from the others, provide a clear line of redress if technological and contractual difficulties arise. It also can reduce contractual ambiguity, increase operational efficiency and improve buildability through improved communication (Griffith, 1989; Torrance, 1992). Also, it is accepted that, by their nature design and build contracts are conducted in a mainly overlapping fashion, design is undertaken whilst construction is already underway, resulting in early completion of the project (Rowlinson, 1988, Nahapiet and Nahapiet, 1985, NEDO, 1983).

In 1981, the Joint Contracts Tribunal published the JCT Standard Form of Building Contract with Contractor's Design (CD 81) which in effect gave final acknowledgement that design and build was an accepted mean of procurement.

Design and build is the fastest growing procurement system in the U.K. (Franks, 1992; Cheetham and Jaggar, 1990; Chartered Quantity Surveyor, 1989, Ndekugri and Turner, 1994). Franks, 1992, estimates that design and build contracts account for about 35% of non-industrial and non-housing turnover in the U.K. construction industry. This figure approaches 45% when industrial and housing turnover are included.

Design and build is therefore firmly established as a procurement option in the U.K. construction industry, and is expected to increase further. Recent reports (Franks, 1990b, 1992; Griffith, 1989) have shown that design and build has been growing at an average rate of 15% per annum. Following this trend, these reports indicate that by the year 2000, over 50% of the construction workload in the U.K. will be procured through design and build. This trend is also sustained by the construction industry and its client alike. The Centre for Construction Market Information (CCMI) survey, 1990, revealed that clients, architects and contractors were confident about the continued rise of design and build. This is also supported by the findings of Ndekugri and Turner, 1994.

THE PROCESS: HOW DOES DESIGN AND BUILD WORK?

As with all other construction procurement routes design and build begins with the client's need to build. The client will then appoint his/her team of consultants who will work together to establish the client's requirements. The client's requirements are then drawn to form the client's brief. This document will be then sent out to those contractors who have been invited to tender for the work.

The contractors are then in a position to prepare their proposals for both the design and construction of the project within the bounds of the client's brief, ascertain the time it will take to carry out the works and in the same time prepare an estimate of the cost. The documentation they produce is known as the "contractor's proposals". Then, after the evaluation of each tender, the client and his/her advisers will select the contractor who will carry out the work. Once agreement has been reached the parties are bound by contract. Following the signing of the contracts, the successful contractor prepares a full detailed design and co-ordinates and manages all aspects of the site works through to final completion of the project.

THE DIFFERENT VARIETIES OF DESIGN AND BUILD

Within the overall concept of design and build, a number of names have emerged to describe what might be called different "varieties" of design and build procurement (Rowlinson, 1988; Rowlinson, 1987; Janssens, 1991; Building Market Report, 1992; and Akintoye, 1994). The difference between them can usually be related to the proportion of the design, undertaken by the client's consultants and by the contractor. However, in this study, the different varieties of design and build are considered under four main piers. These are as follows:

1. **Develop and Construct:** In this variety of design and build, the contractor inherits the design that might have been developed by the client's consultants to a stage that the contractor has only to develop the details and construct the work.
2. **Novation design and build:** This is a form of design and build where the client passes his/her own architect onto the design and build contractor to produce detailed drawings as part of the contractor's team. During the design stage through to the appointment of the design and build contractor, the architect works directly for and is paid by the client. Once a contractor is appointed, the architect's appointment is assigned to the contractor for whom the architect produces any outstanding information which is necessary to construct the work. Payment for this section of the architect's work is made by the contractor.
3. **Design and Manage:** In this variety, the contractor is employed to undertake the majority, if not all, of the design and is responsible for the overall management of the project.
4. **Package Deal:** This is the traditional form of design and build where client is involved in relatively little design, and a contractor is appointed to undertake the principal part of the design and construct the work.

In the first two varieties (develop and construct and novation), the client's design input is substantial. They are appropriate where client needs to determine the basic concept of a project before inviting competition and yet still requires a single point responsibility for the constructional interpretation and execution of design. Usually a

client opting for these two varieties is experienced, well informed and has enough knowledge about the construction industry as a whole and design and build in particular, and also has or engage a relatively full design team for the production of design. Whereas, in the remaining two varieties (design and manage and package deal), the client is involved in relatively little design, and it is the contractor who is responsible for the principal part of the design. Therefore, the client rarely employs a design team in these two varieties, however, he/she may engage a consultant to assist him/her in the evaluation process, and to check the contractor's design drawings as they develop through the course of the contract.

Hence, the different varieties might be distinguished as "client-led design" (develop and construct and novation) and "contractor-led design" (design and manage and package deal). However, in the case of the client-led design varieties, one might argue that, the advantages of design and build are partially lost because, for example, the responsibility for design becomes more complex and the designs that are more fully worked out limit the possible utilisation of the contractor's expertise.

Moreover, the design and build contractors offering the above varieties vary in terms of their organisation; design and construction expertise which they offer. The majority of contractors offering design and build services were existing building contractors. Some of them formed their own design departments, taking on designers as direct employees. Others, kept their traditional organisation and employed external designer on a job to job basis. Rowlinson, 1988, from evidence collected during case studies of individual projects, classified the design and build organisations under three broad categories, namely: Pure design and build, Integrated design and build and Fragmented design and build. However, in this study, the different design and build organisations are classified into two broad fold, namely:

1. **In-house design team:** This category strives for holism, a complete and self-contained organisation where, all the necessary design and construction expertise resides with one organisation and this is sufficient to complete any task that arises. Such an organisation would be well equipped to offer one of the two "contractor-led design" varieties (design and manage and package deal).
2. **External (without an in-house) design team:** As the name implies, in this category, the organisation takes a less than holistic approach where the organisation might have only a quite small design group whose task is to take the client brief and then appoint external consultants to develop the design. In this category, the organisation would be appropriate for one of the two "client-led design" varieties (develop and construct and novation).

However, although there are a number of varieties of design and build and different categories of design and build organisations, the design and build form of contract is primarily structured in the interest of the client.

PERFORMANCE OF DESIGN AND BUILD

The emergence of design and build as a method of procurement has been surrounded by scepticism and reservations concerning its use and performance. Nahapiet and Nahapiet, 1985, believe that design and build provided a high degree of flexibility and response to changes at all stages of a project which, along with phasing of design and construction, results in early completion of the project. NEDO, 1983, also confirms this view. This is certainly a commonly held belief, that because of the nature of

design and build, i.e. the contractor's early involvement; the multi-disciplinary approach; the overlapping of design and construction phases, projects carried out under this form of contracting perform well as far as speed and cost are concerned. Unfortunately, these views are not shared by everybody, the method has been heavily criticized by professionals (Murcutt, 1988). It has been voiced that design and build falls short of quality standards and that the architectural significance of buildings is being lost. Franks, 1983 states: "package deal may have technological versatility but there are not usually associated with prestigious buildings". Furthermore, to back up Franks view, Bennett and Flanagan, 1983, in their series of articles entitled "New Direction: Management Options", suggest that design and build is only suitable for simple and well defined or standard building.

It is worth mentioning that all these views were made in the early 80's. Since then, and following the lifting of the RIBA ban, architects have taken up front positions within design and build firms, resulting in the qualitative design expertise of the architect to be injected into design and build. This has led to improved quality and aesthetically pleasing buildings being produced by design and build. This view has been listed in Franks, 1990b, as one of the advantages benefiting design and build.

There is ample evidence to suggest that design and build has come a long way to distance itself from the "tin shed" image of the past. This is demonstrated by its ongoing increasing popularity which emphasizes its acceptance and broad use by the client to projects which were previously thought to be too complex for this method of procurement. Further evidence to support this creed is provided by James Franks views who is a regular writer about design and build. While in 1983, Franks stated that design and build was not to be associated with prestigious building, 10 years later, in 1993, he maintains that: "there is ample evidence of high technology being satisfactorily completed using design and build approach". Furthermore, to back up Franks view, Ndekugri and Turner, 1994, in their survey of contractors, designers, and building contractors regarding design and build issues concluded that there is no apparent reason for the quality of construction in design and build to be lower than with the traditional approach and that the view that the design and build procurement method is only suitable for very small and simple projects is no longer tenable.

ADVANTAGES OF DESIGN AND BUILD

The benefits of design and build are well documented in Franks, 1990a; Rowlinson, 1988; Griffith, 1989; Torrance, 1992, Akintoye, 1994; and Ndekugri and Turner, 1994. It should be noted that few advantages can also be gained with other forms of procurement methods. However the most peculiar to design and build are listed below:

- Design and build provides single point responsibility so that in the event of a building failure, project difficulty with construction or design, the contractor is solely responsible and wholly accountable to the client.
- The client knows, with a reasonable degree of accuracy, the total financial commitment before commencing work on site, provided he or she does not introduce changes during the course of the works.
- The client has direct contact with the contractor. This improves line of communication and enables the contractor to respond and to adapt more promptly to the client's needs.

- Design and build promotes the creation of an integrated design and construction team. This improves communication and directs team work towards satisfying the interests of the client.
- Significant savings in project time are possible through overlapping the later stages of design with the early stages of construction, leading, therefore, to considerable savings in cost.

LIMITATIONS OF DESIGN AND BUILD

Griffith, 1989, informs us that design and build is not without its limitations. With the contractor being responsible for the design and construction elements of the building, Griffith, 1989, argues that the client is at risk where the contractor does not fully appreciate the full risk associated with design. Similarly, the client is at risk if the contractor does not have full indemnity insurance cover.

After the initial success of design and build, there was an explosion of firms claiming to be design and build specialists. However, it was obvious that some of these so called “specialists” were not capable of taking on the sole responsibility for large projects and simply did not have the resources to produce the quality product that the client required.

As mentioned earlier, one of the prominent features of design and build is that construction is allowed to start on site before design is completed. The limitation of this practice is that the client may have to commit him/herself at an early stage to contractual and financial arrangements which he or she might prefer to consider only when design was completed.

Changes of the client’s requirements once the contract has been signed are likely to be more expensive both indirect cost and in disruption costs if the contractor’s building sequence is affected.

A further disadvantage for the client using a design and build procurement is that the nature of the contract means that the contractor and designer are one and the same. Consequently there is the potential that if one part of the construction team were to act in a manner which is disadvantageous to the client then it is unlikely that the other section will bring this to his or her attention.

ATTITUDES OF PROFESSIONS

The emergence of design and build as a major method of procuring buildings has been met by a lack of acceptance by some professions within the industry (Ndekugri and Turner, 1994; Torrance, 1992 and Griffith, 1989), especially the architect who saw design and build as a treat to his/her profession. This hostility towards design and build was demonstrated by the Royal Institute of British Architects (RIBA) and the Royal Institution of Chartered Surveyors (RICS) codes of professional conduct which, until recently barred their members from taking up senior appointments in design and build firms (Ndekugri and Turner, 1994 and Franks, 1993). With the emergence of design and build perhaps the largest change for the construction industry, has been the change in traditional roles of the members of the construction team. Indeed as Cecil, 1983, states, no-one will be affected more than the architect. He maintains: “Design build implies major changes in roles, relationships and responsibilities, and for no-one more radically than the architect”. This change has lead architects to feel being stripped of their powers and perhaps to be the strongest opponents of design and build as a method of procurement. They, architects, claim that the system is weighted too

much in favour of the contractor, i.e. the control of the project swings from the architect to the contractor. The danger is that, they maintain, the integration of the design and construction phases forces the buildability aspects of projects to the fore. This, opponents argue, leads to architectural significance of buildings being lost. This argument is supported in an article by Stewart and Spring, 1993 entitled "Design and Build" in the *Building* magazine. The article recognises that design and build was, indeed seen by architects as an attack on the quality of design. These views were echoed in late 1993, when architects were given the opportunity to express their opinions of design and build in a debate sponsored by the *Building* magazine entitled "Design or build which is more important?". In the debate, Richard MacCormac, until recently the RIBA President, took the opportunity to condemn modern methods of procurement and to complain that design and build in particular was responsible for the demise of good design in the British construction industry. He was also quick to point out that the cause of this demise was the removal of the architect as the central figure. He blamed this erosion on "inexperienced clients with an ignorance of design", claiming that the short term vision of clients was taking British design "Back to the 1960's" (Design and Build Debate, *Building*, 1993, p. 21). However, the hostile comments expressed in the debate should not be taken to be the feelings of all architects, indeed a recent article by Hutchison, 1991 in the *Architects Journal*, entitled "Design and Build: Views from the pews", states that architects must recognise that their own failings in leadership have contributed significantly to the growth of design and build. Furthermore, following the design and build market success in recent years coupled with the lifting of the ban imposed by the RIBA on its members allowing them to become full partners and to take up senior appointments in design and build firms, there is evidence of a beginning of a shift in opinion that architects are accepting that design and build must now be considered as a serious option (Stewart and Spring, 1993, *Building*, pp. 20-21). The architects attitudes towards design and build as a procurement method is probably best summarised in the Tavistock Institute briefing paper No. 2, 1996. The paper notes that: "Architects appear very divided - while many find work through D/B, many see it as bad for design and as displacing their role in interpreting the client's requirements".

THE FUTURE OF DESIGN AND BUILD

For a relatively unresearched area like design and build (Nicholson, 1990), deciding on what assumptions should be made about the future is indeed difficult. However, considering the trend; i.e. a growth at an average rate of 15% per annum, (Franks, 1990b, 1992; Griffith, 1989), these reports indicate that by the year 2000, over 50% of the construction workload in the U.K. will be procured through design and build; one might conclude that the future of design and build is bright and extremely encouraging. However, looking ahead to the year 2001, the Centre for Strategic studies in Construction (CSSC, 1989) is of the view that building in year 2001 will be different from the one that exists today. They identified essential changes which are likely to take place. Changes which can be recognised as simply the application of modern management principles to the works of the building industry (CSSC, 1989). Some of these changes include greater need for construction organisations to meet the needs and expectations of the client, as well as increasing competition between groups of companies within the U.K. and abroad. The CSSC, 1989, calls for significant change in skills needed to meet the needs of the future.

Similarly, in a major research project sponsored by the Foundation for Management Education and Ashridge Management College titled "Management for the future", Barham et al, 1988, noted that: "organisations face a future of unprecedentedly rapid and complex changes". Also looking into the future direction of the U.K. project procurement, Hamilton, 1990, suggests that the client body is not yet fully satisfied with the services offered by the industry. Furthermore, Hughes, 1992, notes that: "The construction industry and its clients are still trying to sort out reliable methods of procuring construction". Furthermore, in July 1994, the Latham Report was published. This combined government and industry review into procurement and contractual arrangements in UK construction industry investigated many of the major problems within the industry and attempted to recommend changes that would improve its efficiency. The report's major conclusions include the need to adopt a client focus and improved team work amongst the participants. The goals are expressed in terms of a productivity target of 30 per cent real cost reduction by the year 2000.

Another factor which is regarded by many construction writers as likely to shape the future of the construction is the advancement in technology (The Tavistock Institute, 1996; Brochner, 1990; CSSC, 1989; Chow, 1989). The Centre for Strategic Studies in Construction (CSSC, 1988), in its report "Building Britain 2001", maintains that: "We need to move away from the habit of bombarding each other with information which may or may not be relevant and use technology to focus on relevant information". Taking these views in consideration, it would be, therefore, the design and build organisation's utmost interest to respond to these changes positively if it is to remain in business in this competitive market for the year 2001 and beyond, and also, if it is to provide the kind of services which the construction industry and the client of the future will demand.

SUMMARY AND CONCLUSIONS

Design and build as a method of procurement method is a fundamental change in the concept of procuring buildings compared with the traditional methods. It places the responsibilities for both design and construction on to the contracting side of the industry, i.e. the main contractor. It obtained recognition from the Joint Contracts Tribunal in 1981 with the publication of the JCT Standard Form of Building Contract with Contractor's Design (CD 81). This recognition was met by a changes in the British architects and chartered surveyors codes of practice which allowed their members to become full partners and to take up senior appointments in design and build firms. These were clear signs that design and build is now a respectable and sensible way of procuring buildings. The view that design and build is only suitable for very small projects is no longer tenable. The method has been used successfully on large and complex projects.

Although there are a number of varieties of design and build and different categories of design and build organisations, the design and build form of contract is primarily structured in the interest of the client.

There is ample evidence that design and build is growing in popularity and is satisfying the inspiration of many clients and as a method of procurement, design and build has firmly established itself in the U.K. construction industry. It is forecasted that by the year 2000, over 50% of the construction workload in the U.K. will be procured through design and build.

The future of design and build is promising and as a method of procurement is here to stay provided that, the design and build organisation acknowledge the challenges which lay ahead as a nature of design and build, continue to meet the ever demanding client's requirements in a satisfactory manner and respond positively to the changes in order to be able to provide the kind of services which the construction industry and the client of the future will demand and to remain in business in this competitive market for the year 2001 and beyond.

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