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COBRA 2010

The Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors

Held at Dauphine Université, Paris, 2-3 September 2010

ISBN 978-1-84219-619-9

12 Great George Street
London SW1P 3AD
United Kingdom

www.rics.org/cobra

September 2010

The RICS COBRA Conference is held annually. The aim of COBRA is to provide a platform for the dissemination of original research and new developments within the specific disciplines, sub-disciplines or field of study of:

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- Legal aspects of construction and procurement
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Peer review process

All papers submitted to COBRA were subjected to a double-blind (peer review) refereeing process. Referees were drawn from an expert panel, representing respected academics from the construction and building research community. The conference organisers wish to extend their appreciation to the following members of the panel for their work, which is invaluable to the success of COBRA.

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‘The first estimate should equal the final account’ - quantity surveying and the development of elemental cost analysis and cost planning

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Abstract

After the Second World War, during a period of national shortages and austerity, there was a huge demand for school buildings which led to the introduction of strict cost limits on schools places by the U.K. government. These pressures on public sector finances in turn led to the development of a completely new method of design cost control known as cost analysis and cost planning.

The aim of this research is to investigate the historical development and the significance of elemental cost analysis and cost planning. The method of investigation is via examination of published source documents including textbooks, journals, conference papers and government publications.

The research identified the important contribution made to innovative school design and cost planning by the Hertfordshire County Council. However, the real pioneer of cost analysis and cost planning was James Nisbet at the Architects and Buildings Branch in the Ministry of Education with the publication of Building Bulletin No 4 *Cost Study* in 1951.

Substantial support and encouragement in the development of this new discipline was provided by the architectural profession throughout the 1950s through the forum of the *Architects’ Journal* with case study cost analyses and expert comment and the RIBA who organised a major conference on the theme of *Architectural Economics* in 1956. Later in 1961, the Cost Research Panel of the RICS created the Building Cost Information Service.

In this current period of economic austerity some of the fundamental principles and practices of cost analysis and cost planning laid down in the 1950s and 1960s by these innovative architects and quantity surveyors may need to be re-learnt and applied particularly on central government and local authority projects.

Keywords

Elemental cost analysis, cost planning, quantity surveying, James Nisbet

Introduction

In 1951, after years of austerity and shortages, the Festival of Britain on the south bank of the river Thames in London provided a real tonic to the nation and particularly to the lost generation of young architects. Indeed such a consensus of design approach emerged that it later became known as 'Festival of Britain Style' (Ratcliff J, 1976). This was a time of high hopes and ideals of new ways of building and unparalleled opportunities. However in the 1950s shortages of skilled manpower and materials, rising costs and competing claims on the nation's resources, meant that the public sector, where most of the work was carried out, was involved in a fervent demand for increasing the speed of building, whilst at the same time searching for cost reductions and maintaining standards of quality.

In the early 1950s the quantity surveyor's prime function was the preparation of bills of quantities and the settlement of the financial accounts. It was generally acknowledged that the traditional bill of quantities had many advantages including: helping to reduce the builders' overheads, removing the risk from the tendering process and helping to ensure parity of tenders. Traditionally, the client's initial estimates were calculated based on a cubic foot basis and if tenders exceeded the estimate all the quantity surveyor could suggest was to reduce the quality of the specification or delete part of the project which would be reflected in a reduction or an addendum bill incorporated in the accepted tender. Ferry et al (1999:6) identify that following the Second World War the art of accurate single price estimating became increasingly difficult due to three factors: unsettled uneconomic conditions, the use of non-traditional designs and the increasing proportion of cost represented by engineering services.

Public clients were beginning to demand more accurate first estimates based on space and quality standards. Architects were also looking for the quantity surveyor to improve the cost advice during the design process. A more comprehensive cost control service was required based on scientific analysis. This new approach of cost control during the design phase was aimed at ensuring that the tender cost equated with the first estimate. It involved establishing a realistic first estimate (often based on government cost limits) during the brief or investigation stage, developing the cost plan at the end of the investigation stage and cost checking throughout the design process. The estimate established the cost within which the architect was required to work - 'designing to a target cost'. The cost plan thus assisted the architect to design a building which was of even quality, gave value for money, and which was within the estimate.

Hertfordshire County Council's Schools

In 1946 Hertfordshire County Council (HCC) was faced with a massive school building programme - 175 schools to be built over 15 years. This was a result of a combination of factors: the wartime baby boom, the imminent raising of the school leaving age to 15 and the transfer of population from London to the new towns of Welwyn, Hatfield, Stevenage and Hemel Hempstead. Significantly, several of the institutions which contributed technically to post-war construction were based in the County, within easy access of County Hall. The Building Research Station (BRS) (now Building Research Establishment) were based at Garston outside Watford, the Fire Research Station was based at Borehamwood and the Furniture Industry Research Association in due course moved to Stevenage. The HCC architects would develop a close working relationship with these organisations during the 1950s.

Following recommendations from the BRS, the Wood Committee report in 1944 on school building had advised on the use of a prefabricated lightweight steel frame structure based on a standard modular of 8'3" (2.515m.) grid. The County Architect Herbert Aslin and particularly his enlightened Deputy Architect Stiratt Johnson-Marshall were architectural pioneers and were committed to modern architecture particularly 'light and dry' systems. As a result the Hills 'Pressweld' system with a lightweight steel frame and concrete panels, which had been tried on housing projects, was adopted for use on the Hertfordshire school building programme. 'The first two schools built with the Hertfordshire system, Burleigh infants at Cheshunt (1946-48) and the village school at Essendon (1947-48), show the characteristic qualities of the system and the variety that could be achieved with it' (Bullock, 2002:188).

Encouraged by Johnson-Marshall the Hertfordshire team of architects were real pioneers of innovation. Saint (1987, chapter 4) describes how they continually searched for improvements involving a continuous organized cycle of design, production, feedback and development. This was typified by the liaison with a wide variety of component manufacturers, including sanitary equipment, floor tiles, warm air heating systems, lighting, school furniture, in order to encourage the development of modern economic designs. 'Herts laid down procedures for collaboration and interchange between users, designers, manufacturers, technologists and clients which were more ambitious, continuous and considered in scope than anything previously attempted in British architecture' (Saint, 1987:111).

However in practice the Hertfordshire school building programme was not without its problems. The project value of components finished off-site amounted to no more than half of the total value resulting in a large amount of wet trades including excavation and plastering. This combined with errors in setting out, complex joints, numerous variations, difficulties with deliveries, quality control

issues and the difficulty of managing numerous nominated subcontractors meant that ‘the managerial problems over the new manner of building would become almost insurmountable’ (Saint, 1987:94).

Under the guidance of the Chief Quantity Surveyor Clifford Nott, HCC was one of the pioneers of cost planning. Their method of cost planning was a much simplified method when compared to those defined in the MOE’s Building Bulletin No. 4 ‘Cost Study’ first introduced in 1951. Nisbet (1961:165) explains that ‘If an architect is familiar with the cost/area/specification relationship for a particular type of building (as well he may be in the architect’s department of a Local Authority) it has been found very satisfactory to arrange him to prepare a sketch scheme which, after alternative construction forms and major planning considerations have been discussed, is then passed to the quantity surveyor for a full and detailed estimate. The estimate then becomes the initial cost plan to which the architect designs.’

Nott (1960:429) identifies that ‘The actual choice of elements should be able to be varied by sub-division or grouping as required and I favour rather broad sections so that more common design problems can be considered within the limits of one section’. Under the Hertfordshire method of cost planning ‘…..setting cost targets for elements - is not done.’, and ‘It is therefore a justifiable action (risk) for the architect to produce a sketch scheme and pass it to the quantity surveyor for a full estimate which becomes the initial cost plan to which the architect designs’ Nott (1960:432). Significantly, Nisbet records that the first elemental bill of quantities was produced by HCC in 1954 (Nisbet, 1989:61).

The Architects and Buildings Branch of the Ministry of Education

In 1948 Stirrat Johnson-Marshall left Hertfordshire after less than three years to become chief architect to the Ministry of Education (MOE). He was to hold this appointment for eight years during which time the revolution which he started at Hertfordshire spread to the rest of the country. ‘Through its Architects and Buildings (A&B) Branch, the Ministry of Education was in a position not only to advise local authorities on school design and to comment on their proposals for new building, but crucially, with the establishment of the Development Group in 1949, to build new projects’ (Bullock, 2002:221). Indeed, the relationship between the local authorities and the MOE was frequently held up as a paradigm for general emulation by other government departments.

The Branch, which later grew in size, had the responsibility of ensuring that local education authorities provided 2 million school places by 1961, an increase of 40% in 15 years. The procedure for approving grants for expenditure was initially based on the practice in use before 1939. Local

Authorities submitted designs and an estimate of cost, calculated based on the cubic method, or a tender and both design and cost were approved if they both appeared to be reasonable.

However in 1949 the method was changed with the introduction by the MOE of cost limits per place for both primary and secondary schools. In 1950 these were set at attainable levels - £195 for primary schools and £320 for secondary schools. However, in 1951 the cost limits were reduced to £170 and £290 then to £140 and £240 in 1952. 'This was a period of rising building costs, so that real reduction was greater – perhaps as great as fifty per cent' (Saint, 1987:119). This dramatic reduction in cost limits is confirmed by James Nisbet 'The results of the application of cost limits have seldom been published and their success in achieving their objectives cannot be measured in statistical terms. However the original intention of the MOE cost limits was clearly successful in reducing the cost of primary and secondary schools by 50% between 1949 and 1952' (Nisbet, 1989:102). Furthermore, despite a continued increase in prices, the cost limits did not rise above the 1951 level until 1961.

In 1950, Stirrat Johnson-Marshall, then Chief Architect at the MOE, summarised the situation. 'We are forced to choose between three courses of action. The first is to build only the small amount we're likely to be able to afford. The second is to accept a drastic reduction in space and quality whilst maintaining the same total. The third course is to approach the whole problem of building afresh, with the object of devising a fundamentally simpler technique: a technique which gives us greater beauty, comfort and value at a lower cost' (Nisbet, 1989:90).

Bullock (2002) identifies that by the time Johnson-Marshall left the MOE in 1956, the A&B Branch had already begun to affect the form of school building in three important ways. Firstly, it was responsible for circulating information on the most successful new developments and their costs. In 1949 the MOE began publish a series of Building Bulletins in which the current thinking was set out by those directly involved in the work. Secondly, the A&B Branch secured better value for money after undertaking fundamental research into the cost of buildings. For the first time the separate elements of a building were costed independently. 'An elemental analysis of cost made it possible for the first time for the architect, and the client, to understand how the overall cost of the school was allocated across different elements of the school and thus to determine at the design stage priorities for expenditure' (Bullock, 2002:222). Thirdly, in order to demonstrate that its cost targets could be met in practice the Development Group of the A&B Branch built a number of prototype schools.

From 1949 to 1957, the Development Group developed five different school buildings. All were lightweight rather than traditional construction: two of the systems were in steel, one was in aluminium and two were in precast concrete. Saint (1987:129) identifies that 'The biggest single proprietary manufacturer of schools at this time was the Bristol Aeroplane Company, a technically go-

ahead firm whose ingenious aluminium school-building system served chiefly as an outlet for excess capacity following the post-war slump in aircraft orders.' Bullock (2006:56) notes that 'For most authorities complete prefabrication was not cheaper than traditional building.' 'Their principal advantage was that they were faster to erect and needed less site labour than traditional building.'

In 1957 the MOE Pamphlet No 33 *The story of post-war school building* (MOE, 1957) identified five ways in which the cost per square foot of school building had been restrained from rising as fast or as steeply as general building costs:

- By greater knowledge and control of the constituent items of cost (through cost analysis and cost planning)
- By substantial reduction in the in the cubic content of each school building (mainly by lowering ceiling heights)
- By harnessing scientific and industrial to architecture skill in search of better and more economical methods of solving old problems (through prefabrication, better fire protection, more efficient light fittings and reduction in underground ducts)
- By reducing the scale of school buildings and their fittings from that of an adults to that of a child's world (toilet facilities, cloakroom fittings, cupboards and furniture)
- By not indulging in costly architectural styles and devices.

In 1957 Pamphlet No 33 was a pioneering document describing in essence what we know today as value management/value engineering.

Building Bulletin No. 4 Cost Study

One of the first tasks of the A&B Branch was the production of bulletins as a means of conveying educational and technical experience together in a helpful format. The first Building Bulletin No. 1 *New Primary Schools* issued in 1949 set out for local authorities the lessons learned by the Hertfordshire team.

In 1951 the MOE in its publication 'Building Bulletin No. 4: *Cost Study* introduced the concepts of elemental cost analysis and cost planning in connection with the cost of school buildings. The Bulletin, which included a specimen elemental cost analysis, was issued to 145 local authorities to assist them in obtaining value for money 'The Minister hopes therefore that local education authorities and their architects will try out the technique suggested in this Bulletin and send him their comments' (MOE, 1951:1). In essence the Bulletin described the techniques of designing to a cost target.

Carter, (1958:287) identifies that 'The technique (cost planning) was first used by the MOE Architects and Building Branch in 1951 on their development school in Wokingham (in Berkshire). County authorities were encouraged to adopt the method by the issue of Building Bulletin 4 *Cost Study* in 1951, but few of them did so until rather later on. 1956 saw the beginning of an increasing interest in the method among architects and surveyors generally – a few of them in private offices.'

In March 1957, the second edition of the building bulletin was published to reflect the development of cost analysis and cost planning and the experience gained by architects and quantity surveyors in the five years since the publication of the first edition. The second edition was greatly increased in size from 24 to 153 pages and included the cost analyses for seven actual schools and confirmed the principles tentatively proposed in 1951. Significantly it identified the design sequence by which an architect translated a brief into drawings and specification. For the first time it also described the relationship between the stages of design and showed the integration of estimating and cost planning.

'Of the various systems of Cost Planning, the MOE method and the development shown here are unique in that they deliberately recognize cost as a design factor influencing the project from the start in the same way, but to no greater extent, as site, climate, labour and material resources etc' (Nisbet, 1961:165). Furthermore, 'The sequence of the architect's work described in the second edition of Building Bulletin No. 4 superseded the generally held notion that design consists of two stages only – sketch plans and working drawings – and it preceded by some 10 years the Plan of Work for Design Team Operation which was first published by the RIBA in 1967' (Nisbet, 1989: 46).

Influence of the RIBA and the RICS

In the 1950s the RIBA took a positive lead in the search for a more efficient construction industry reflected in the vast number of papers published in the architectural press particularly in the Architects' Journal (AJ). 'The first published cost analysis appeared in Architectural Design in March 1952 – it was for Garston Day Nursery and supported an article with illustrations and a detailed specification of one of the HCC's fabricated schools' (Nisbet, 1989:40).

From 27 January 1955 through to 28 October 1955 the AJ published a series of ten articles on the subject of the cost management of a fictitious Office Building. Contributions were made by N. Stanley Farrow, a builder; Clive Barr, an architect; James Nisbet, a quantity surveyor; Ivan Tomlin, an estimator; and E. F. L. Brech a management consultant. Later, from 10 November 1955 through to 23 February 1956 the AJ produced a series of five articles on the subject of the building contract.

On 24 February 1955 the AJ began the publication of a regular series of elemental cost analyses. Within the first 15 months 34 cost analyses had been published covering 11 types of buildings including in addition to schools, houses, factories and health buildings, an hotel, a railway station and a laboratory.

At the 1955 RIBA Conference on the subject *The organization of the Building Industry and the Architect's Responsibilities* G Grenfell Baines made two significant observations: 'One of the reasons our clients do not start soon enough is that they are uncertain about the costs, and a suggestion I would like to make is that we do establish a cost information service, we could collaborate with the industry to do it, and the other professions, and keep it up to date and publish it and give it publicity' (AJ, 23 June 1955:852). 'Sir Thomas has asked where the quantity surveyor should be; my answer is, most of the time in the architect's office. We use a quantity surveyor as a co-designer in the very early stages; he is one of the most useful men to bring the economic factor into the plans' (AJ, 23 June 1955:852).

So influential were the *Architect's Journal* articles and building analyses that the RIBA were persuaded to hold its 1956 conference at Norwich on the theme of *Architectural Economics* and to set up a Cost Research Committee chaired by Anthony Pott. The AJ for June 14 1956:665 identified that the leading themes for discussion were:

- 'There should be more research into user requirements more development work by local authorities and a better exchange of information within the profession and between the profession and sources of knowledge;
- cost analysis and cost planning should become familiar tools for the architect and quantity surveyor ("as co-designers") and the elemental bill should be more widely used, and
- economics should enter into the architect's training.'

At the Norwich conference Clifford Culpin (chairman of the RIBA Housing and Town Planning Committee) commented 'I should like to see this conference give the strongest support to the elemental bill of quantities and to send a resolution to our friends at the RICS to encourage them to adopt this system at the earliest moment. Quantity surveyors as a profession have always seemed to me to be singularly conservative. We must get them to adopt a more imaginative and flexible attitude and to co-operate with us in the very earliest design stage instead of, as so often happens, only coming in when the drawings are complete' (AJ June 14 1956:668).

In the 1950s the conventional bills of quantities was divided into trades generally aligned to subcontractors' work. This division of work simplified the task for the general contractor's estimator in respect of work to be sublet. However, in order to produce cost analyses in the format described in

Building Bulletin No 4 it was necessary to produce an elemental bill of quantities, in which the main divisions were design elements or constituent parts of the building (an element can be defined as 'a part of a building that fulfils a specific function or functions irrespective of its design, specification or construction'). As a result similar items would occur in different elements thus making the task of the contractor's estimator more difficult.

In March 1957 the RICS committee on elemental bills issued a report which concluded against the use of this type of bill of quantities. The editors of the AJ considered that this displayed a serious lack of evidence from those with practical knowledge and on April 25 1957 commissioned two teams of architects, quantity surveyors and builders to express their opinions for and against the use of the elemental bill (AJ April 25 1957: 633-637). The architects considered that the elemental bill provided a superior source of reference and analysis during the design stage. In contrast the quantity surveyors considered that the elemental bill took longer to produce and was more expensive to print which reduced the profit margin in their professional fees.

James Nisbet records that 'Following the publication of the second edition of Building Bulletin No. 4 in March 1957 the AJ maintained its campaign for cost control by organising in conjunction with the Regent Street Polytechnic a series of 6 lecture discussions between April and June. The meetings created enormous interest and were attended by about 350 representatives of architects, quantity surveyors and builders. It was noteworthy that few, if any, services engineers came to the meetings' (Nisbet, 1989:48).

In September 1958 the RIBA Journal reported on an investigation undertaken by the RIBA Cost Research Committee on effective design stage cost control systems. Despite including input from the MOE, London and Sheffield County Councils, three architectural practices and the design and build division of builder George Wimpey, the Committee concluded that 'effective cost control systems have yet to be established in general design practice'.

Whilst the architects and the RIBA seemed totally committed to the new concepts of elemental cost analysis and cost planning many quantity surveyors were not so convinced. Nisbet (1989: chapter 5) describes the initial reluctance of quantity surveyors in the private sector to accept these new methods which had been introduced in the public sector. Indeed, in 1957 the Cost Research Panel of the RICS rejected the methods of cost planning which had been clearly defined in 1951 in Building Bulletin No. 4 *Cost Study* and produced an alternative method of cost planning. Nisbet (1989:64) considered that 'This procedure was indistinguishable from the preparation of estimates from drawings and specifications' and 'The result did not differ in principle from a mail order catalogue and the architect was expected to select the specification he liked best.'

In 1957, at an exhibition at the Brixton School of Building, the RICS Cost Research Panel showed a method of cost planning used by the Sheffield City Architect Mr J. L. Womersley on the large multi-storey complex at Park Hill. This followed the MOE method of setting cost targets for each element except that the targets were calculated based on approximate estimating (AJ Apr 25 1957:597 & The Chartered Surveyor May 1958:613-620). Clive Browning, a partner in private practice, RICS prize winner and part-time lecturer, confirms this approach. In his book written for architectural students he includes a chapter describing how the cost plan is prepared, where no cost data is available, based on approximate quantities estimating. Browning confirms the RICS approach stating that he considered the best method of approximate estimating to be the approximate quantities estimating and he did not consider elemental bills desirable (Browning, 1961:81&106).

However, at the end of 1961 the Cost Research Panel of the RICS sanctioned a pilot scheme to establish a building cost information centre which led to the formation of the Building Cost Information Service (BCIS). The BCIS finally marked the conversion of the RICS Quantity Surveyors Committee to elemental cost analysis and cost planning which by that time was slowly beginning to be accepted as standard professional practice.

The contribution of James Nisbet

James Nisbet had gained his professional grounding with a busy local authority in Scotland. In June 1946, Nisbet joined HCC as an assistant quantity surveyor. ‘Nisbet began while at Herts to collect detailed costs of all the jobs he could lay his hands on. He soon began to ask himself why, when the Hertfordshire schools were mainly built of standard components, they differed so much in cost. Thus far he had only an inkling of an idea; that if buildings were broken down into the generic parts or elements in terms of which they were designed or used, a comparison between the costs of these elements might be revealing’ (Saint, 1987:119). Later, in December 1949, James Nisbet was appointed as a temporary civil servant in a development group of the A&B Branch at the MOE.

Saint (1987:120) notes that in 1951, James Nisbet together with chief administrator William Pile wrote the Ministry of Education’s anonymous publication ‘Building Bulletin No. 4: ‘Cost Study’ in which elemental cost analysis and cost planning were explained for the first time - this was to become the most widely used and quoted of A&B Branch’s early publications. The Building Magazine’s *Hall of Fame* reports James Nisbet’s comments made in 1978: ‘It was a courageous thing to take the decision to publish. The quantity surveying profession didn't like it at all … they thought it would give them more work for the same money. RICS didn't like it at all … they set up a committee to kill the

elemental bill.' Nisbet, later reflected that 'The introduction of the techniques was not the only reason for the reduction in school building costs but their contribution was significant' (Nisbet, 2006).

On October 30 in 1953 *The Builder* published a long letter from James Nisbet in which he clearly spelt out the opportunities for the quantity surveyor. 'This type of cost control requires close collaboration with the architect at an early stage of his design, when the quantity surveyor will be called upon to display a more detailed knowledge of costs than has been usual in the past.' 'Cost planning therefore opens up a vast new field to the quantity surveyor where he can play a more valuable part in the design of buildings'.

These latter comments are reinforced with James Nisbet's observations made at the RIBA Cost Control Conference in 1959 'The surveyor's present skill is closely related to the down to earth world of measurement and builders' prices but cost control will bring him into a creative world that could become the major part of his expertise' (AJ January 1959:186). Nisbet considered that 'the cost plan must be prepared *jointly* by the architect and quantity surveyor' and speculated that 'such a close association could, in the long run, lead to an amalgamation of architects and quantity surveyors in one firm ' (Nisbet, 1959:23&25).

In 1961 James Nisbet produced, in association with eight other quantity surveying practitioners, one of the first textbooks on estimating and cost control for the building client. In the Preface to the book (Nisbet, 1961) states 'The methods and ideas which are contained in this book have evolved over the last ten years and have been tested in practice. Nevertheless they are still in an evolutionary state and are offered as a basis for further study. They attempt to forecast solutions to future requirements rather than to catalogue methods which have been found satisfactory in the past.' This significant textbook includes chapters on the importance of estimates including a review of the historical background to present methods and future methods, the theory of cost control during design, approximate estimates, cost analysis, cost planning and the effect of plan shape on cost.

In 1962 the Architects' Journal published a 9-part series of articles entitled 'How to make the first estimate = final account'. The short articles on the cost planning process were based on talks given to members of the War Office Quantity Surveying Branch by James Nisbet (by then chief quantity surveyor of the War Office) and other senior quantity surveyors in the War Office (Nisbet 1962, a-f; Drake, 1962; Mitchell, 1962 and Cooke, 1962).

The 1962 series of articles identified the principal requirements of a cost control system: establish a realistic first estimate, establish how the estimate is to be spent, and confirm that the sum spent is as intended. The articles recommended that the approximate estimate at the brief-stage should be

calculated based on space, quality and use requirements using the cost analyses of similar previous buildings. At the investigation stage the cost plan should be prepared based on an elemental cost analysis approach with adjustments made for quality, quantity and price level. At the design stage detailed cost checks of the elements should be undertaken by approximate quantities and at the tender stage a cost analysis should be prepared. Critically, the architect and quantity surveyor should work together as a team with the close involvement of the building services consultant.

Later, James Nisbet made further significant contributions to our understanding of the development of quantity surveying as a profession and building contracts and procurement systems from the Middle Ages to the present day with his self publication of five books (Nisbet, 1989; Nisbet, 1993; Nisbet, 1997; Nisbet, 2002; Nisbet, 2005). Sadly, these books are now all out of print and difficult to obtain.

Conclusions

The introduction in the 1950s of elemental cost analysis and cost planning made a significant contribution to the reduction in school building costs. It was an important new development introducing a discipline on the whole design process. It forced early consideration of problems that might otherwise be left until later and compelled a more detailed and comprehensive investigation of design issues and construction methods.

The research has identified the important contribution made by the innovative design pioneers at Hertfordshire County Council under the guidance of Deputy Architect Stiratt Johnson-Marshall and Chief Quantity Surveyor Clifford Nott. Substantial support and encouragement in the development of this new discipline was provided by the architectural profession throughout the 1950s through the forum of the *Architects' Journal* with case study cost analyses and expert comment and annual conferences. Later in 1961, the Cost Research Panel of the RICS created the Building Cost Information Service (BCIS). However, the real mastermind behind the development of cost planning was James Nisbet who died in 2009 aged 89. His development of the revolutionary concept of 'designing to a cost' based on elemental cost analysis and cost planning at the A&B Branch in the MOE was first described with the publication of Building Bulletin No 4 *Cost Study* in 1951.

In this current era of economic austerity it is prudent to identify the lessons which may still need to be learnt or in the words of one leading cost planning expert 're-learnt' for application in the public sector including:

- Recognize cost as a design factor
- Design to a cost target

- Develop a realistic first estimate based on stringent government cost limits
- Develop the cost plan based on an elemental cost analysis approach, cost check throughout the design process
- The architect and quantity surveyor should work together as a team (preferably in the same office) with the close involvement of the building services consultant
- On schools projects consider the use of standard modular grids, standard components, light and dry systems of construction and off-site prefabrication
- Continually search for improvement including liaison with component manufacturers
- Use value management/value engineering techniques on the project
- Liaise with the Building Research Establishment
- Utilise a central control unit to circulate best practice guides and information on successful projects to all local authorities
- Share best practice through case studies and annual conferences
- Do not indulge in costly architectural styles

Cost planning has evolved significantly since these early days. Cost plans can now embody replacement costs, operation and maintenance costs, whole life costs, Standard Assessment Procedure (SAP) energy efficiency ratings and the BRE's Environmental Assessment Method (BREEAM). As Joe Martin, Head of the BCIS comments 'The move from 'costing a design' to designing to a cost' and the development of cost planning has served the profession well in offering value added services to its clients. The concept of elements has been incorporated into the development of life cycle costing and value management. It has also spread around the globe and both the term and its definition are enshrined in national and international standards' (www.bcis.co.uk/blog -accessed 20 March 2010).

References

Browning C.D. (1961) *Building Economics and Cost Planning*. B.T. Batsford Ltd.

Bullock N (2002) *Building the Post-War World: Modern architecture and reconstruction in Britain.* Routledge, Taylor & Francis Group.

Bullock N (2006) *Reconstruction, School Building and the Avant-Garde.* Conference, Team 10 - Keeping the Language of Modern Architecture Alive. Delft Faculty of Architecture, January 5-6, 47-59.

Carter J (1958) *Cost Analysis and Cost Planning*. Architectural Review. April, 284-287.

Cooke J.E. (1962) *Cost Check,* Architects' Journal. April 18, 835-837.

Drake B (1962) *Preparing the Cost Plan,* Architects' Journal. April 4, 739-740.

Ferry D.J., Brandon P.S. & Ferry J.D. (1999) *Cost Planning of Building: 7th edition.* Blackwell Science.

Ministry of Education (1951) *Cost Study Building Bulletin No 4*. HMSO. London (A second edition was published in March 1957 with a third edition in January 1972).

Ministry of Education (1957) *The story of post-war school building: Pamphlet No 33.* HMSO. London.

Mitchell R.S. (1962) *Cost Analysis*. Architects' Journal. March 14, 569-571.

Nisbet J (1953) *Changing Conditions in Building: The Challenge to Quantity Surveying*. The Builder, 30 October, 670-671.

Nisbet J (1959) *The Role of the Quantity Surveyor during the Design Stage.* The Chartered Surveyor, July, 20-25.

Nisbet J (1961) *Estimating and Cost Control.* Batsford. London.

Nisbet J (1962a) *Changing role of the quantity surveyor.* Architects' Journal. February 7, 303-304.

Nisbet J (1962b) *New needs and demands.* Architects' Journal. February 21, 409-410.

Nisbet J (1962c) *Principles of cost control.* Architects' Journal. February 28, 461-462.

Nisbet J (1962d) *Estimate.* Architects' Journal, March 7, 519-520.

Nisbet J (1962e) *Cost planning generally.* Architects' Journal. March 28, 669-671.

Nisbet J (1962f) *Questions and Answers.* Architects' Journal. May 9, 1011-1014.

Nisbet J (1989) *Called to Account: Quantity Surveying 1936-1986*. Stoke Publications.

Nisbet J (1993) *Fair and Reasonable Building Contracts from 1550 A Synopsis*, Stoke Publications.

Nisbet J (1997) *A Proper Price Quantity Surveying in London 1650 to 1940*, Stoke Publications

Nisbet J (2002) *A Turbulent Transition Building Contracts 1980 to 2001*, Stoke Publications

Nisbet J (2005) *Building Contracts Reformed Building Contracts 2001 to 2004*, Stoke Publications

Nisbet J (2006) *Inventing the cost plan.* Building Magazine. 10 March.

Nott CM (1954) *Surveying and Specification: Cost Analysis.* The Architects' Journal. 16 September, 353-355.

Nott C.M. (1960) *The Development of Cost Planning During Design Stages.* The Chartered Surveyor. February, 429-436.

Ratcliff J (1976) *Architects and the Festival of Britain*, within: Banham M & Hillier B *A Tonic to the Nation: The Festival of Britain 1951.* Thames and Hudson, London.

R.I.B.A. Cost Research Committee (1958) *Cost Control at the Design Stage.* R.I.B.A. Journal, 366-375.

Saint A (1987) *Towards a Social Architecture: The Role of School Building in Post-War England*, Yale University Press, New Haven and London.

Acknowledgement

The author acknowledges the assistance given by Brendan Patchell from Rider Levett Bucknall UK Ltd in providing information on the modern cost plan.