MANAGEMENT OF VALUE IN THE BRITISH CONSTRUCTION INDUSTRY

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Matthew B. Locke graduated from the University of Edinburgh in 1976 as an architect and spent 12 years practicing architecture in the UK and Middle East. Five years ago he joined Bovis Construction and is now a Value Management executive within the Program Management division. Matthew has developed value management systems and techniques within Bovis. He has acted as value coordinator on projects up to £170 million including student accommodation, an opera house, commercial developments, railway, and airport projects. The studies have ranged from reviewing clients' briefs through design to procurement.

Elizabeth Randall trained as an architect at Kingston School of Architecture, graduated in 1982 and worked in a small architect's practice in Oxford specialising in housing and restoration of historic buildings. Five years ago she joined Bovis Construction Limited as an architect member of the central Value Engineering (VE) unit and later became coordinator for concept stage studies carried out on an annual project value of £500 million. Projects studied ranged from major office developments and shopping centres to serial building society outlets and petrol service stations. This year Elizabeth has worked with Matthew Locke to develop Value Management as a stand alone consultancy service, reviewing and combining experience, standardising techniques and testing the UK construction industry market place.

ABSTRACT

The paper illustrates how the need for Value Management (VM) has developed in the British construction industry describing the traditional attitudes which prevail.

An outline is given of the objectives of Value Management and how the methods have been developed from the adaptation of VE techniques. The paper concludes with the benefits of the process and brief details of a case study to demonstrate the success of the process.

The objective of this paper is to illustrate the development and increasing acceptance of VM in the British construction industry in the last decade and in particular to describe the VM system which we have developed within a major British construction company. The paper is in three parts.

1) The first section of the paper sets the scene, providing an insight and background to the British construction industry and the company environment within which we have been working.

2) The second section of the paper deals with how VE techniques have been adopted and adapted to suit the British construction industry.

3) The third section constitutes a case study to demonstrate the benefits of VM in the British construction industry.

THE BRITISH CONSTRUCTION INDUSTRY NOW

The Current British Benchmark

These results indicated that the British construction process needs a higher level of challenge from inception to operation of a construction project in Britain. VM studies had been carried out on the British baseline project during the design development and cost reductions had been achieved. The British project has been handed over and is considered to be cost effective in British terms according to the requirements of the financial institutions, letting agents, design team standards, and the developer. So what has gone wrong and why are costs so high?

PROFESSIONAL BOUNDARIES

The answer to this question lies partly in the compartmentalised construction industry in the UK.

Over the centuries, as buildings have become larger and more complex with shorter programmes, a plethora of specialist professions have grown up, each as an individual profit centre and each with its own private agenda for a project.

Furthermore, although the UK tends to be less oriented to litigious actions than the USA, exposure to risk by each profession is to be avoided at all costs:

- Clients want to build the right building and will insist in changing their brief throughout the project often irrespective of the effect of the changes.
- Funders want buildings to last - anything less than 10 years is considered a temporary building, even though occupiers' needs and fashions may dictate a major refurbishment being required at between 5--10 year cycles.
- Architects are accused of designing for gold medal awards with scant regard for cost.
- Structural Engineers want maximum factors of safety with little regard for aesthetics.
- Mechanical & Electrical Engineers demand maximum service zones and plant areas and large factors of safety.

This scenario stems from the fact that professionals do not share a common design environment. Furthermore, they have been educated separately in their isolated disciplines and are accustomed to working independently.

British forms of Appointment and Forms of Contract compound this situation often ensuring that the contractor is not introduced to a project until it has been fully designed when it is too late to bring construction expertise to the design process.

Under this regime, the Architects, traditionally the consultant team leader, often takes an insufficiently detailed brief (many clients understandably lack the expertise to translate their own business needs into an effective building brief).

The Architect then interprets the clients' brief according to his own design parameters still without the benefit of early structural or services engineering input and most certainly without construction input, which will only be introduced much later.

The design professionals do not, therefore, act as a cohesive team throughout a project. They may well progress the design along a specific path only to discover that the budget has been exceeded or the scheme is not buildable and the project either needs drastic surgery or a complete redesign.

The performance of fragmented design teams has further been threatened by the pressure of open fee competition. Gone are the days when architects can habitually investigate alternative design solutions at their leisure then develop what they consider to be the most appropriate concept for the client. Time and financial

constraints often encourage our designers to seek a first and easy solution.

CATEGORY	PRICING CRITERIA	COMPARITIVE COST
UK Baseline and Performance	Building priced to British Design	100%
USA Category 1 accordance with British	Buildings priced entirely in drawings and specifications	100%
USA Category 2 codes and standard	Buildings priced to reflect US practices maintaining design and performance intent	92%
US Category 3 standards to and	Buildings priced to adjusted requirements of typical USA clients and tenants.	68%

In summary, the following factors often prevent the production of the most appropriate design or best value scheme:

- individual designers working in isolation
- core construction skills (buildability, logistics, programming, procurement) completely omitted from the design process.
- poor briefing separated from and financial constraints on designers to investigate any alternate solutions.

EARLY BRITISH VE

VE was first introduced to British manufacturing industry in the 1950s and led to the setting up of the Institute of VM in the mid 1960s. Interest in the Institute dwindled and it was not until the early 1980s that VE as a technique began to find favour in the construction industry. Paradoxically, this coincided not with a time of shortage such as the second World War, which saw the birth of Value Analysis in the USA, on the contrary, it was a time when the opulence and scale of construction projects was growing.

The introduction of management contracting, construction management and, more recently in the UK, Program Management construction contracts have gradually been involving the contractors earlier in the design stages as part of a project team.

This early involvement of contractors has often met with considerable resistance amongst the traditional members of the design team.

The technique of VE was reintroduced to the British construction industry in the early 1980s as a result of forward looking British Construction Companies and Property Developers researching techniques in the USA. VE was perceived as representing a "moderator" of the construction projects to achieve a balance of time, cost, and quality and to investigate alternative methods of constructing building elements.

The application of VE enjoyed some measure of success on a wide range of major construction projects, although when applied as independent VE studies, it has tended to stoke up the traditional inter-professional resentment and increase counterproductive confrontational attitudes.

Clearly, if VE was to have the opportunity to exercise a stronger influence on the British construction industry, an alternative approach was needed. It was against this background that the Bovis techniques were developed.

VM —THE CREATIVE CHALLENGE

The primary aim of VM is design optimisation achieving a balance of time, cost, and quality.

Designers often feel their work to be the primary target in VM studies, but there are equally great opportunities for improvement in value in the client's requirements.

- organisation costs
- management costs
- enablihg works
- procurement route
- project implementation

WHEN TO APPLY VM

The opportunity to improve the value of a project is at its greatest at the project inception, but, as the project progresses, the construction cost of elements become committed, for example, by the time Town Planning Approval is submitted external materials and massing of the building will have been substantially committed representing about 30% of the project costs reducing the scope for improvement of value to 70% as can be seen from figure 1.

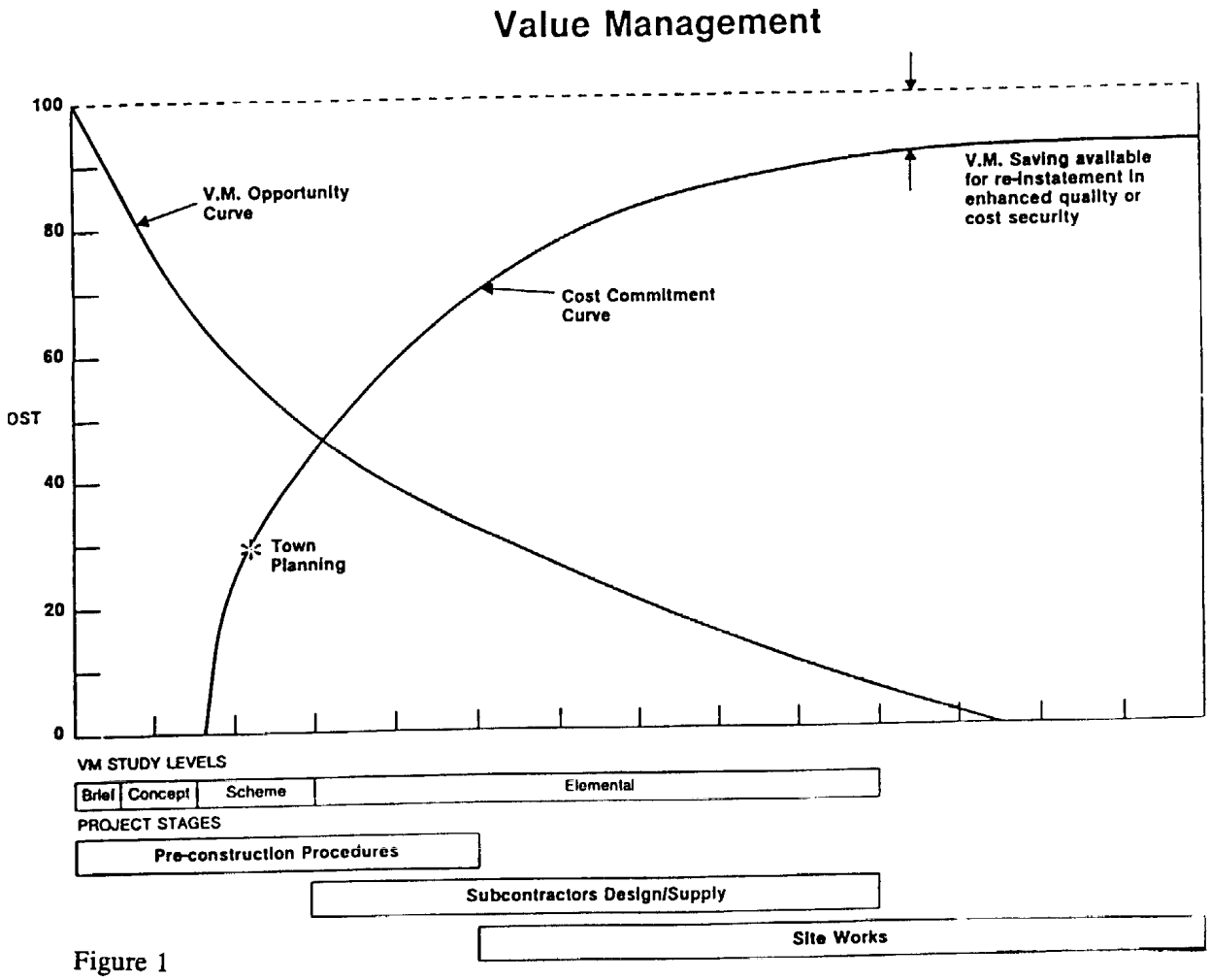

Figure 1

The influence of VM can be extended right through to the tender procurement stage by careful structuring of the contract documentation. To minimise the prescriptive influence of British design teams, the use of design intent drawings with performance specification provide the contractors tendering for the works with the maximum opportunity to offer more cost effective alternatives with their tenders. VM sessions at this late stage are focussed on the mid bid interviews where the search for more cost effective alternative methods or materials are identified and reviewed.

For maximum benefit, the process of VM should commence at the earliest possible stage with the development of client brief and continue through the design stages of the project up to and including procurement of trade contractors. There are five main study levels at which the VM should be applied to achieve maximum benefit for the client at all levels.

The depth of study required at each level must be determined to suit the size and scope of the project. The five study levels are identified on figure 2 with the participants, tasks, and deliverables identified for each level. (See Figure 2)

Bovis Value Management Study Levels

STUDY LEVEL	TEAM	TASKS	DELIVERABLES
1. Brief	• Client • VM Co-ordinator • Design Team • Cost Planner • Specialist	• Determine needs / wants • Set target ratios • Set target costs • Identify excess requirements • Function analysis • Generate / Evaluate alternative options • VM strategy	• Tested brief • List of creative ideas • Target ratios • Target costs • Implementation strategy • Risk Management
2. Concept Design	• Client • VM Co-ordinator • Design Team • Cost Planner • Planner • Specialist	• Compare efficiency ratios • Compare target costs • Identify excess requirements • Function analysis • Generate / Evaluate alternative options • Evaluate site opportunities • Buildability reviews • Programme alternatives • VM strategy	• Evaluated alternatives • Outline Specification • Optimum layouts • Principal materials • Approximate budgets • Notional programme • Implementation strategy
3. Scheme Design	• Client • VE Co-ordinator • Design Team • Cost Planner • Contractor • Specialist • Programmer	• Review efficiency ratios • Review costs • Function analysis • Generate / Evaluate alternative options • Temporary works / buildability reviews • Optimum Statutory Authority compliance • Procurement strategy • Early TC involvement • Life cycle costs	• Tested scheme • Design strategy • Procurement strategy • Cost Plan • Implementation strategy • Programme • Alternative opportunities • Outline method statements • Cost effective tender package
4. Elemental Design	• Client • VM co-ordinator • Design team • Cost planner • BCL project manager • BCL package manager • Trade contractor • Specialist	• Function analysis • Generate/evaluate alternative options • Appropriate selection and use of materials • Avoid over specification • Optimum performance related design information • Ensure design flexibility for TC proposals • Trade sequencing and interfaces • Mid bid reviews with TC's • Life cycle costing	• Alternative opportunities • Outline method statements • Cost effective tender packages • Interface matrix • Implementation strategy • Change control
5. Procurement	• Client • VM Co-ordinator • Design Team • Contractor • Specialist • Programmer	• Generate / Evaluate alternative options • Optimum performance related design information • Trade sequencing and interfaces • Mid bid reviews with TC's	• Cost effective methods • Optimum information level • Optimum programme • Optimum safety / quality • Optimum document control • Effective management / communication

Figure 2

Figure 2

THE VM TEAM

The first important task is to identify the key interest groups who will participate in the project as they are the stake holders in the process.

The participants at the VM study level 1 will tend to be predominantly clients and users participating in the explicit, rational decision making process. As the project progresses, the strategic client/user representatives will be replaced by increasingly technically and construction oriented participants, but it is important to maintain the participation of client/user representatives to ensure that all stakeholders are represented. The second important task is to set out a programme for the application of VM.

The programme for VM will have to be developed to suit the size and nature of the project. For example, on a small project, 2 or 3 studies would be adequate during the course of the project. On larger projects, a greater level of VM input will be required with 1-2 VM reviews at study level 1. During the later stages, VM input can be carried out at predetermined stages or applied as a continuous process as part of the design reviews.

External specialists will be introduced to the team where appropriate, but the key dedision makers from design team will be the creative focal point of VM; in this way the design team will not feel the process threatens their role in the project.

VM applied in this way becomes integrated with the normal process of design development; it is a positive design tool which can reduce abortive design costs rather than the negative influence which VE can be perceived to have on the design.

THE VM STUDY STRUCTURE

The structure of each study level will be determined to suit the size and complexity of the project, but will generally follow a pattern of:

- Information gathering
- Set objectives for the study
- Determine project targets
- 1-2 day workshops
- Task Group working
- Group co-ordination/reporting
- Implementation and monitoring

The structure for the workshops and Task Groups follow the classic VE job plan with study sessions being carried out over 2-6 weeks to allow development of proposals dependent upon the compexity of the project.

THE VM FACILITATOR

The role of the VM facilitator is to act as a rational guide and to ensure that the creative challenge process is followed.

The involvement of the construction consultant in the early VM study levels is important to ensure that the team have a balanced view and are not purely design oriented as so often tends to be the case.

The construction oriented facilitator brings to the VM study not only a "fresh pair of eyes" removed from the detailed involvement in the design. In addition he brings the following skills:

- Buildability
- Logistics
- Programming
- Cost Planning
- Procurement
- Risk Assessment

The VM sessions will help team dynamics, building respect amongst the various parties producing a Master Builder Team which works together with a common goal, embodying all skills required to satisfy a client's absolute requirements in the most cost effective way. The interactive benefits of this team leads to a more efficient design process.

This model has been proved to work in the British construction industry and will help not only to achieve better value for money for the client, but will also help to make the British construction industry more cost effective.

VM OBJECTIVES

The Objectives of every VM study must be tailored to suit the particular needs of the client or the project, but will broadly fall into the following headings:

- Optimum compliance with Functional Requirements.
- Avoid unnecessary costs
- Maximum efficiency ratios
- Optimum provision for flexibility
- Avoid over specification
- Balance Capital/life cycle costs
- Improve programme
- Standardised elements

There is a great temptation for VE/VM exercises to generate volumes of paperwork, however, the success of a study cannot be measured by the volume of paper, rather the influence on the value of the project. It is essential that ideas be quickly and concisely recorded and for this reason there are two key forms which should be used.

The Proposal Form to record and highlight the key factors of the proposal to circulate within the VM team and enable evaluation.

The Summary Form pulls together a log of the proposals as a record of proposals, their status. This form is used as an agenda for VM meetings and to monitor the implementation of the proposals.

IMPLEMENTATION & MONITORING

VM studies are a very fertile environment for the generation of alternatives, but it is equally important to ensure that the benefits are not lost between studies. At the conclusion of each study level it is essential that a strategy for implementation of the proposals is set and that the incorporation of ideas is monitored.

A VM CASE HISTORY

Bovis Construction were appointed as Construction Managers at the Master Planning Stage of the project prior to the full design team. The Construction managers agreement included the responsibility for Management of Value. A strategy was prepared for the application of VM on a continuous basis during the course of the project. Every member of the Project Team were required in their terms of appointment to participate in the VM of the project.

The key statistics of the project are:

Ludgate Development	City of London
Project Duration	1988-1992
Developer	Rosehaugh Stanhope Developments
Project	Reconstruction of Railway underground 850,000 Sq. Ft. of speculative commercial office space in four buildings
Value	£160 million including railway works.
Architects	Renton Howard Wood Levin and Skidmore Owings & Merrill
Structural Engineers	Ove Arup & Partners and Skidmore Owings & Merrill
Services Engineers	Jaros Blaumn & Bolles and Skidmore Owings & Merrill
Cost Consultants	Gardiner & Theobald
Construction Managers	Bovis Construction Ltd.
VM Facilitator	Bovis Construction Ltd.
Cost Reduction	15% due to market conditions 15% due to VM
Efficiency Ratios	8% improvement in wall:floor ratios 6% improvement in net:gross ratios

In view of market conditions, the main objective for VM was to reduce costs to an ambitious target, however, the completed development had to maintain equal standards of quality and specification to that achieved on other projects by this leading British developer. In view of the unique demands of the site, the abnormal costs were analysed in detail to determine the most cost effective solution to meet these demands.

After an initial concentrated VM study, subsequent sessions were carried out as an integral part of the design reviews at monthly intervals on each separate building during the progress of the project, up to and including the tender stages of each element.

The main areas of cost reduction resulting from VM can be summarised as follows:

Substructure	-1%
Superstructure	-3%
Core Efficiency	-2%
External Cladding	-5%
Services	-3%
Finishes	-1%
Total	-15%

SUMMARY

The Bovis approach to VM has proved to be an effective proactive process which has brought the following benefits to the project:

- A positive design tool which will minimise abortive design work.
- Build effective teams
- Improve the predictability of time, cost, and quality of projects.

Achieve best value for the client.