

# THE IMPLEMENTATION OF VALUE MANAGEMENT AS A DESIGN MANAGEMENT TOOL IN THE UK CONSTRUCTION INDUSTRY

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Reviews of the UK construction industry have documented inefficiencies which contribute to a lack of quality in project outcome. Research shows that the design process plays a significant role in achieving success in project development and outcome. The literature on design management and the conflicting agenda underlying the design process and the management process is reviewed. This review is related to our study which reports on the perceptions of construction professionals concerning the implementation of Value Management. A number of results emerge. There is agreement that some problems arise from the complexity of the design process and its separation from construction processes, and that efficient design management can aid integration. The research supports the conclusion that although Value Management is deemed to be a valuable design management tool, there are significant barriers to its use. These range from a lack of education to the characteristics of the industry. This study shows that there is an awareness of the benefits of Value Management although its potential within the industry has not been realised.

Keywords: design management, value management, design team

## INTRODUCTION

A number of reports have documented the UK Construction Industry as being inefficient and beset with problems of performance and quality. Additionally globalisation has intensified the need for companies to seek ways of gaining a competitive edge. Latham (1994) and Egan (1998) recommended improvements in the industry's efficiency and performance, highlighting the need for effective design management to bridge the gap between design and construction. This separation is acknowledged to result in higher costs and lower productivity. Many authors suggest that design management is required to organise the complex information within the design process as decisions made at this stage have the greatest impact on a project's success. This supports the concept that design management can play a significant role in improving the competitive edge of the UK construction industry. This paper aims to compare literature findings with the current perception of Value Management (VM) as a design management tool in the UK Construction Industry. The current perception of VM was investigated using a case study.

## THE NEED FOR DESIGN MANAGEMENT

Egan (1998) emphasised that much time and effort is spent on site trying to make designs work. He suggested a significant re-balance of the typical project so that all the issues of performance, costs and sustainability are given more prominence in the design and planning stage leading to the integration of design and construction. The

practical activities which would support this integration focus on the use of feedback, collaboration between participants and their need to be aware of the interrelationship and interdependency of all aspects of the development process. The Egan Report reiterated many of the issues raised by Latham (1994) who noted that effective management of design is crucial to the success of a project. However he recognized that the design process is complex and has the potential for a lack of coordination. Previous reports had suggested that it is best practice for a project to be fully planned before construction commences, as the risk of uncoordinated project documentation during the design stage is high. Although Latham agreed with this he felt that the industry should be robust enough to meet the wishes of clients by beginning on site before the design is completed.

Many authors comment on the problems associated with design, such as inadequacies in design information and lack of constructability. Ford *et al.* (1994) considered that the need for design management arose because the construction industry contains much complex information which is inefficiently managed. Coles (1991) recognised that poor design management can contribute to delivering projects over time, over budget and of poor quality and identified distinct areas which could lead to problems in the design process including a lack of technical expertise, fragmentation, distrust and divided responsibilities. Bordass and Leaman (1997) considered that the problems could be due to the different perspectives of participants. Clipson (1992) argued that not only had the gap between design and construction widened but that the construction phase is often highly fragmented, with many separate organisations contributing to the process. He postulated that an integrative strategy to reduce this gap would be to design for construction, through effective design management, the challenge being to unify the design and construction processes so that improvements could be made in project outcome.

## **DESIGN AND ITS MANAGEMENT**

The inability of much of the industry to use design effectively is not a new problem. References to it predate the Great Exhibition of 1851. The Design Council, set up in 1944 and the Corfield Report of 1979 attempted to generate interest in the better use of design. They both had an impact, but did not solve the problem. Allinson (1997) considers design as a wild card, as its values are poorly understood and its methods are difficult to explain. The different meanings attributed to design promote confusion. The definitions vary widely and show the difficulty of trying to encompass the scope and complexity of design. Common to all design decisions is that they entail the creative visualisation of concepts and ideas. Pilditch (1990) described effective design as an untidy process combining analysis, imagination, practicality and sensibility. Lawson (1990) postulates that a model to describe a clear method of creating includes the activities of briefing, analysis, synthesis and evaluation. However studies of creative people fail to provide evidence of any obvious process. Ford *et al.* (1994) proposed a number of models which try to define how designs are created. They felt that by utilising such techniques the production of accurate information would result. However the current range of technologies, the universality of materials and the size of many of today's buildings escalate the complexity of the process focusing emphasis on the management of the development process.

The early days of management in the UK were related to the Industrial Revolution. Management encompasses the activities of planning, organising, leading and controlling the use of resources to accomplish goals. Success in the management

process requires an ability to recognise problems and opportunities, make good decisions, and take appropriate action. These functions are interrelated and this has important ramifications for management as to achieve success each function needs to be performed with maximum effectiveness. The Engineering Council (1986) was adamant that the process of design had to be managed if any product was to be completed on time, to budget and to the desired quality. It is recognised that the cultures of design and management do not complement each other and that designers are often perceived as being eccentric. Copper and Press (1995) understood that these conflicting agendas exist but highlighted the importance of arguing for design management. Brickwood (1990) thought conflict could be overcome if managers and designers worked more closely together to acquire an informed awareness of each other's methods. The earliest formal reference to design management was probably made by Farr (1966). He described it as a professional activity involving a "go-between", bringing together companies and designers. Clipson (1992) described it as the participation of all involved to promote collaboration on projects from conceptual design to completion and occupancy. Managing the design involves a number of organisational levels and activities, namely planning, organising, implementing, monitoring and evaluating design. This latter activity is frequently forgotten, yet it provides essential information for continuous improvement in the use and management of design. Allinson (1997) provides a cohesive and pertinent definition describing design management as concerning itself with the design content of project outcomes and the effective management of the design process. Within an architectural context he found that there are three principle dimensions to design management: a concern with programming; constructional issues and the management of information flows.

It is generally thought that the head of the design team is the natural leader throughout the project. An examination of the pattern of work shows that different groups predominate during the design process. At any time one will be dominant and will lead in the decision making process. Brandenburger (1995) felt that it is the architect who is best placed to manage the overall process and that if this profession is to prosper, architects must diversify into the field of management. Many architectural practices now recognise that their designs will only be correctly realised if they exercise this management role. Traditionally the architect has been expected to provide the design leadership including the co-ordination of the work of other professionals. Others such as Brickwood (1990) found that those who were not design specialists could effectively manage design with the appropriate support. There is a difference of opinion as to who is the appropriate design manager. However the primary concern is to achieve consistency throughout all phases of the project.

The management of design is fraught with difficulties. Conflict may be generated because design is complex and managers often lack the required knowledge of design to manage it (Dumas and Whitfield 1990). Other factors adding to its complexity are that the process can be endless, involves problem finding and solving, there is no one agreed method, and it involves subjective value judgements and the prioritisation of objectives. Bovis Construction Design Management Procedures (1990) try to overcome these difficulties by suggesting that the establishment of design stages throughout the process is necessary to assist with its monitoring and controlling. Also by subdividing the stages the design can be regularly reviewed. It can then be established if the design information is being developed to the required standard and in accordance with the cost budget and programme requirements. It has been noted

that recognising the skills of the designer is also necessary (Gorb 1990). The overall concept the literature suggests is that, whichever approach is taken, design must be and can be managed in order for projects to be completed successfully.

Strategies and theories have developed to determine how design can be managed. Some companies, like Bovis, have developed structured procedures to follow. However, it is recognised that the strategy chosen will depend on the project. Authors have suggested the use of management tools such as communication systems, quality management and risk estimation. It is acknowledged that the evaluation of information is critical to the design process. An independent review of the design ensures that it is competent, gives value for money and will provide long-term satisfaction. An independent review should be a requirement of modern design due to its complexity. Among the tools, which enable this evaluation to take place, are design reviews, constructability studies and maintenance reviews. Copperman (1989) felt, in common with much of the literature, that VM is a management tool that can gain the desired results within the constraints of time and cost.

## **VALUE MANAGEMENT AND COST MANAGEMENT**

The history of VM is well documented, as is its aim to combine product performance improvement and cost reduction through a formal procedure based on an analysis of function and value. The growth in VM practice through different government agencies in the US and private industry led to the establishment of the Society of American Value Engineers (SAVE) in 1958. Locke and Randell (1994) state that VM was first introduced into the UK through the manufacturing industry in the 1950s. Its application in construction projects appears to have commenced in the early 1980s and it has seen some growth in use over recent years. A number of different definitions have arisen to describe the same approach or stage of application and some authors have tried to differentiate between individual terms with separate definitions. SAVE International (1997) favours an all-embracing approach considering the terms VM, Value Engineering and Value Analysis to be synonymous. Norton and McElligott (1995), to try and avoid confusion, give a definition based on the background of VM. They consider VM to be a higher order title, not linked to a particular project stage, but a systematic, multi-disciplinary effort directed toward functional analysis for the purpose of achieving the best value at the lowest overall life cycle project cost.

VM is formulated to be more than a cost cutting exercise. The aim is to increase value either by making the performance of a product better and/or the cost of producing it less. The confusion between VM and cost management techniques arises due to the incorrect application VM techniques turning them into cost cutting exercises, and the use of bad practices by some Value Managers (Alasheash 1994). VM is a management tool that can encompass cost, but takes into account the subjective decision making criteria of the client organisation in perceiving what is or is not acceptable. It does this mainly by using functional analysis and a multi-disciplinary design/building team. Cost management is an objective characterisation of client requirements, which are expressed in monetary terms only and traditionally require the skills of a Quantity Surveyor. It is a procedure partly concerned with reducing cost by deleting parts of the project, by modifying the product or replacing specified items with cheaper alternatives. Though cost management and value management are two distinct activities, both are useful and can complement each other. While VM provides authoritative reviews at milestone points, cost management provides ongoing control of costs throughout the project.

VM may be used during different stages of a project. It can be applied to all construction types and used for all clients. A number of authors including Dean (1999) consider that to be productive VM must become an integral element of the design process thereby becoming an effective design management tool. Heller (1971) strongly felt that VM should be applied early in the design stage as its benefits diminish as a programme progresses towards completion. In their research Clark and Oliver (1998) found that the earlier value studies were undertaken, the greater the returns. Locke and Randell (1994) have found that the opportunity to improve the value of a project is at its greatest at the project inception. As the project progresses, the construction cost of elements becomes committed restricting the options available. The UK appears to be accepting the view that VM should to be used early within a project's life. This is seen, in practice, by an increased use of VM early in projects. Kirk (1989) commented that it is becoming common practice to apply VM first to the client's brief, then to the concept design, and later to the engineering stage. In his long-term research Dell'Isola (1997) found that clients are electing to use VM during the design process as a second look at major design decisions to aid project cost control, improve quality and value. He determined that savings averaging some 5-10% reduction in initial costs are achievable. He went on to suggest that the VM effort develops a cohesive team of self-motivated achievers who are committed to a common objective of optimising owner expenditures using a planned effort. Many agree that a sense of shared interest in problem solving can keep conflicts at a lower level. The DTI (1997) found that the benefits of VM are usually significant in obtaining value for money and improving performance and business procedures. The benefits often surprise those experienced in business by yielding a large return on a relatively modest investment. Authors agree that early VM in the design stage gives the benefit of minimising abortive design work and early use provides greater flexibility to make changes with little cost. The application of a VM study provides participants in the project development process with a more thorough knowledge of costs and the economic impact of various design decisions. Keith van Heerden (1989) felt so strongly about the results VM can achieve that he said, "no organisation and no country can afford to ignore the increasingly important role VM is playin".

The full potential of the application of VM in UK construction projects has never been realised. Organisations within the industry are reluctant to implement it. The need to be cost competitive is necessary for the well being of a company; therefore the implementation of VM should be high. Many authors agree that a successful initial experience of VM is essential for the promotion of VM. Any mistakes can leave senior management sceptical and unwilling to use it again. Failure in the application of VM often stems from a lack of knowledge of the techniques involved. Actual working experiences also contribute to a hardening of attitudes and a fixed mind set. A lack of senior management involvement results in no encouragement being given to its widespread use. Al-Salmi (1989) found through a number of case studies that design teams were often apprehensive of conducting VM exercises, as they were concerned about delays to the schedule resulting from the procedure and any recommended changes. Fraser (1989) commented that a design review does not imply that the initial design was inappropriate. It rather indicates an understanding that the technical, political and social systems in which we operate are constantly changing.

The main reasons for a lack of use of VM can be summarised as failure to adopt a systematic approach, inappropriate team selection, poor leadership, and disbelief. Venkataramanan (1992) found that possible remedies for improving implementation

into the industry centre on early teaching in schools and colleges, the involvement of working personnel and training of VM professionals. Additionally he commented that the rate of use will be affected by the method by which active participation, including that of the client, is encouraged. He also noted that proposals should be presented so that benefits are not exaggerated but accurately predicted. Mudge (1989) agreed that the successful implementation of any program is contingent on it becoming part of an organisation's culture. This in turn requires the appropriate administration, management participation, training and recognition of both individual and group effort. Clark and Oliver (1998) recommended that since VM is about understanding and consensus, careful choice of team members is crucial.

## **CASE STUDY**

### **Methodology**

The case study was based on a questionnaire. Postal questionnaires were used due to time constraints and the respondents being geographically dispersed. The original questionnaire was subjected to a pilot study aimed to eliminate ambiguity. Ten questionnaires were distributed to Architects and Contracting firms. Comments received formed the basis for the revised questionnaire, which included a brief definition of VM. This was distributed to forty firms including Architects, Consultant Value Engineers and Contractors, chosen on the basis of a random selection of large firms. The responses received were not as high as anticipated, only ten being returned. This limited the accuracy of the results obtained, and the spread of opinion, but enabled provisional conclusions to be drawn in respect of the direction of further research and the appreciation of VM within the industry.

The questionnaire was in three sections. Section One required the respondents to consider whether design needs to be managed, whether this is difficult, and who should manage it. It also examined the importance of the design stage relative to the rest of the project; questioned whether early development had the greatest effect on the final outcome and asked if this was under-resourced. Further, the respondents were questioned about their perception of VM as an effective design management tool, and whether they thought VM could bridge the gap between design and construction. Section Two was devised to discover at what point in a project's life VM should be used, by whom, and whether it is perceived as more than just a cost cutting exercise. The respondents were asked to consider the benefits of using VM as a design management tool. Section Three aimed to discover how familiar each respondent is with VM in practice and whether they thought that it should be used more often. They were asked to consider why VM is not used more often, and how the barriers to implementation could be overcome.

## **RESULTS**

The respondents agreed that the design stage can and should be managed although this is difficult. The majority felt that a project management team is best equipped to manage this process, although this was not unanimous and with a larger sample the answer may have been different. This result reflects the literature review. Authors held a wide range of different views. The use of the client or the designers as the design managers can be defended equally as well as the use of a project management team. All but one respondent agreed that decisions made in a project's early stages have the greatest effect on the final cost, quality and time management. They

acknowledged that least money is spent on this stage as a proportion of the total project budget. All agreed that VM is an effective design management tool that can help to bridge the gap between design and construction. There was a difference of opinion concerning when VM can offer the greatest rewards, although all did agree that the least benefits would come from its application in the occupancy stage. Eighty percent felt that its implementation during the design stage would offer most reward. However, the main difference was the order in which the feasibility and design stages were placed. Sixty percent placed them second and first respectively and thirty percent reversed this. Only thirty percent stated that the earlier VM is used, the greater the benefits. The majority of respondents thought that an in-house team rather than an external team should carry out the VM study. Although a mixture of both these options was chosen by at least one respondent.

A number of benefits, resulting from the use of VM, were stated by the respondents. These benefits centred on reducing unnecessary costs, improving constructability and increasing performance, quality and value. Other perceived benefits included improved decision making as a result of better team morale and focusing on the design. All felt that VM is not simply a cost cutting exercise. The sample which responded to the questionnaire were in the majority fairly inexperienced in VM, with 80% having completed between one and five VM studies in the past five years, only 20% having partaken in up to 10 studies in that period. All agreed that the industry could benefit from an increased use of VM. Eighty percent of respondents had always implemented a VM study if it was suggested.

The respondents considered the main barriers to the implementation of VM to be the adversarial and fragmented nature of the industry, ignorance, its cost and a lack of forward planning. This result parallels the findings of the literature review. However what is noticeable is that the culture of the industry and lack of education regarding VM are thought by the respondents to be more important than a lack of senior management support. Recommendations were given as to how the barriers to the implementation of VM may be overcome. The most common responses were to include it as a mandatory service as part of a consultant's terms of engagement, emphasise front end planning of projects to ensure time is made available, to educate clients as to its techniques and benefits and a change in industry culture to promote a cohesive not confrontational working environment.

## **CONCLUSIONS AND IMPLICATIONS OF THE FINDINGS**

The necessity of effective Design Management is generally acknowledged by the industry and the findings indicate that VM is recognised as an effective Design Management tool. Many concede that a variety of problems exist within the design process which need addressing such as the amount of complex information to be communicated. The literature supports the concept that an individual designer's approach affects the design method which they employ, endorsing the idea that design is a complex, creative and undefined process. Management techniques have a definite origin and a structured development. Design and management are therefore perceived to have contrasting interfaces and conflicting agendas. A set of tools to aid design management can be identified although these differ widely in the skills required and the issues dealt with. The findings recognise VM as an effective design management tool. Much of the information suggests that VM has not reached its potential in the UK construction industry. This lack of implementation is considered surprising especially in the light of the documented evidence of its potential benefits.

The findings of the review and study indicate that VM is recognised and accepted within the UK construction industry as being beneficial to the success of a project. However, the case study findings imply that the industry is relatively inexperienced in using VM. The education of all participants in the project development process would lay the foundations for its wider adoption. However the inference can be drawn from both the literature review and the case study that the entrenched habits which exist could be moderated by a more multidisciplinary education before those joining the industry begin to work within their own professions.

The case study supported the findings of the literature review that the early application of VM within a project's life increases the rewards which can be reaped from focusing on design functions and construction objectives, highlighting how the budget cost can be achieved, while maintaining quality and performance standards. The only obvious missing benefit cited by literature that the respondents did not consider was that VM could be used to benefit other similar work without completing another VM study, encouraging the use of feedback and data collection.

The need for change to overcome the problems which beset the industry is much reviewed and long recognised. Over a period of time documented evidence has reiterated the benefits and barriers to the use of VM. However to date the response from the industry is slow. A holistic approach is difficult within a fragmented industry where each project is developed by a multi-disciplinary temporary organisation. It can be surmised that the widespread use of VM techniques in the US was promoted by government intervention as a leading client in the construction industry. Elevating the status of VM as a design management tool by experienced and regular clients of the construction industry would support its wider implementation. The study indicated that the present culture in the UK industry is extremely time conscious. The industry concentrating on the construction phase as this activity is observable and difficult to condense, and often choosing procurement routes which allow for the design process to parallel the construction process. Although evidence shows that it is the decision making or design process that has the greatest effect on the programming and cost of later events, the period allocated to it is often reduced.

Embracing the concept of VM as part of effective design management would aid competitiveness in the UK construction market. Therefore professionals involved in managing the design need to understand the conflicting agenda that exist between design and management and understand the tools which can aid the management of the design process. The decisions made in the early stages of a project affect all its aspects, yet the industry spends the least on this stage, in contrast with other industries. There is a need therefore to review how the budget of a project is allocated. If this stage of a project's life is considered to be one which has the greatest impact on the outcome of a project, then the resources spent on this stage should reflect its importance. It may be that there is as yet no universal acceptance of the importance of the design stage and without this the standard use of design management tools, such as VM, will not spread.

Our research suggests that a lack of management support is not a primary cause of the lack of use of VM as a design management tool, which is at variance with the literature review. The difference could be explained by the perception within the industry of the extent to which senior management has the power to change the culture of the industry. The change in the culture of the UK construction industry that the



respondents call for implies that senior management needs to appreciate the benefits of using VM as a design management tool before its implementation can be increased.

There are aspects of the relationship between design management and VM and the industry that require further research to explain its lack of implementation in the UK. Many in the industry are aware of the issues that hinder the use of VM and recommendations that can improve the likelihood of its use. It can be deduced that knowledge of the benefits and barriers in itself does not address the basic issues hindering the acceptance of VM and therefore its implementation may not increase as expected. Firstly the ambiguous status of the design process needs to be resolved. Research indicates that the design process is of paramount importance in setting the parameters for any project. However time and therefore money constraints focus on the visible activities, namely the construction phase. A catalyst is needed to encourage the industry to reprogramme the time allocated to decision-making or the design process. It is intended that further research should investigate both the industry's approach to and knowledge of design management and the level of education of construction professionals in design management and its tools.

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