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# APPLICATION OF VALUE MANAGEMENT IN CONSTRUCTION

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**Abstract**

The concept of value management (VM) is becoming more relevant to Sri Lankan construction industry. Value Management provides structured, documentable consideration of project stakeholders to ensure that projects are required, framed to satisfy values and sufficiently supported by all stakeholders to ensure successful completion (Austin and Thomson 2001). This is supported by the definition of Albert and Betty (1996) that VM is a structured, systematic, flexible, team oriented approach for assessing the relationship between function, cost and worth. The aim of this paper is to illustrate the development and increasing relevance of VM in the Sri Lankan construction industry in the last decade and to describe the VM systems which have developed within the industry. An outline also is given of the objectives of VM and the methods developed for the application of VM. The paper concludes with the identification of benefits of the process and justifying its relevance with brief case studies which had been carried out to demonstrate the success of the process.

## 1. Introduction

### 1.1 Background

Construction industry is important to the Sri Lankan economy. It has contributed 6-7 % of the GDP (Gross Domestic Product) over the past decade (Central Bank Report, 2002). It is estimated that construction industry is responsible for about 50% of the total GDFCF (Gross Domestic Fixed Capital Formation) (National Account of SL, 2002). It is also seen that construction generates other benefits including income, employment, tax revenue etc. Construction provides employment to about 4-5% average of those employed in the national ecoonomy (Sri Lanka labour Force survey, 2002). Therefore it is evident that construction industry makes a significant contribution to the economy of the country both in terms of production output and the provision of empolyment. As a result an efficiency of the construction industry is a crucial factor for the development of investment portfolio in new resource and manufacturing projects. A lower level of value generated from construction degrades the international competitiveness of the industry, discourages the level of investment in construction and presents an additional cost to projects. In current economic context it is necessary to identify initiatives that will eliminate the extra cost of construction (hidden costs that do not contribute to value) for the future visibility of the industry itself and of the overall economy. To eliminate the extra cost element caused by this aspect of inefficacy, a cost reduction system must target to improving the quality of the decisions made throughout the life cycle of construction projects. In order to deal with these problems, it is important to focus on the value of the project throughout the project life cycle. This is possible through value management as indicated by the definition of Institute of Civil Engineers (1996): "VM addresses the value process during concept, definition, implementation and operation phases of a project. It encompasses a set of systematic and logical procedures and techniques to enhance project value through the life of the facility". VM is used by electronics, general engineering, aerospace, automotive, construction and many other industries, and increasingly by service sectors (Winch 2000). There is evidence of VM techniques that have also been successfully applied to all types of construction from buildings to offshore oil and gas platforms, and for all types of clients from private industry to governmental organizations worldwide.

The first section of this paper provides the broader view of the Value Management based on the literature review and the second section deals with the VM techniques applied to Sri Lankan construction industry based on survey research carried out, by the writers.

### 1.2 Aims

This research aims at identifying and measuring the project and/ or design performance that can be achieved through the application of value management to construction projects.

### 1.3 Objectives

Implementing value management techniques, to improve the project performance is the primary objective of this research: This is derived through the following series of secondary objectives.

- Exploring the current state of application of value management in Sri Lankan construction industry,
- Identifying the importance and benefits of application of value management techniques.
- Analyzing the benefits of value management by application of it at different levels of the construction process. That is value planning, value engineering

and value analysis (These terms will be explained later).
- Finding out whether the performance can be improved through application of value management.
- Measure project performance in terms of time, cost and quality targets of the project.

### 1.4 Methodology

The research methodology adopted can be summarized as follows:
- A detailed review of literature to analyse and understand the state of knowledge in VM.
- Interviews to establish the present usage (if any) in the industries, and to find out the level of understanding about the process, it's benefits and costs.
- Case studies are carried out to measure performance variation upon applying value management. These are carried out to match the different VM approaches as follows:
  - Value planning (VP): Two projects are analyzed
  - Value engineering (VE): Two projects are taken into Consideration
  - Value analysis (VA): Two completed projects are considered for the application of VA.
- Measuring Performance will be against variation of project objectives of time, cost and quality. The original time, cost and quality targets are taken as benchmarks.

### 1.5 Scope of Study

Most researchers as well as literature hold the view that significant benefits can be achieved through the application of value management at the early stages of a project. This is supported by the fact that cost, time and quality significant decisions are taken at the early stages of a project. This research will be limited to the building projects but applied through out the cycle of initial stages, design and construction and completion or post completion.

### 1.6 The Scope of the Paper

This paper primarily analyses the state of VM in the global industry today and reports the state of VM in the Sri Lankan construction industry. The paper presents the interim findings of a major VM research project undertaken by the researchers. The structure of the paper consists of a clear definition of VM, analysis of the VM process, the research methodology adopted, the state of VM in the Sri Lankan industry, identification of potential benefits of VM and VM process triggers followed by a perception into methods of developing VM practices in Sri Lanka and conclusion.

## 2. Role of the Value Management

You may come across terms such as value engineering and value analysis and it could be said that the tactical results are achieved by the application of value engineering (in the design & development of project) or value analysis (when seeking improvements to an existing product or activity) (British Research Establishment(BRE), 1997). However it is not important which term is used but what is important is creating and capitalizing on the opportunity to improve value. In this paper the term VM is used as an umbrella term and refers to the process as a whole. It covers all the value techniques whether they entail value planning (VP), value engineering (VE) or value analysis (VA). The following sections explain these terms in more detail.

### 2.1 The concepts of value management

Value management provides a structured and systematic approach in achieving the necessary functions of a project at the lowest resulting cost. Unlike traditional Value Engineering (VE) which focuses only on design and construction, value management is a comprehensive evaluation of all aspects of the project from the project feasibility study, the financing plan and costs, project design & construction and through project operation (http://www.cclcon.com). Therefore, VM include the whole range of value techniques available and can illustrate as the generic process that includes;

- Value Planning (VP) – apply VM during the concept or planning phases of the project.
- Value Engineering (VE) – apply VM during the design or engineering phases of the project.
- Value Analysis (VA) or Value Reviewing (VR) – apply retrospectively to completed projects to analyze or to audit the project's performance, and to compare a completed, nearly completed, design or project against predetermined expectations (Figure 1).

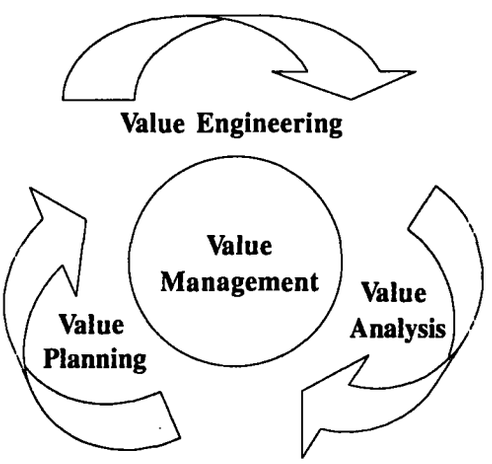



**Figure 1: Generic Process of VM**

Several authors have described value management in different ways. Larry Miles (1961, cited Michel 2001), who is considered as the father of VA/VE, defined good value as:" a product or service that has appropriate performance and cost and as a problem solving system aimed at reducing expenditure of time and money whilst maintaining or increasing performance". This is the view

that has been promoted by most value VA and VE associations worldwide until recently and has found its way into national standards, from the seventies to the nineties.This paper adopts the definition presented by Fong. et al. (1998) :and Green and Popper (1990) who argue that the most precise definition of VM is given by the Society of American Value Engineers (SAVE). "The systematic application of recognized techniques which identify the function of product or service, establish a monetary value for that function, and provide the necessary function reliability at the lowest overall cost".

The new vision of VM as defined by the European VM standards states it as "a style of management that evolved out of previous methods based on the concept of value and functional approach". It claims that VM uniquely brings together (Michel 2001):

- Management style
  - Application of concept of value.
  - Application of concept of function.
  - Customer focus.
  - Creativity
  - Quantitative evaluation
- Positive human dynamics
  - Teamwork
  - Satisfaction
  - Communication
  - Encouraging change
  - Ownership
- Consideration of external and internal environment
- Effective use of methods and tools.

Often there are misconceptions about value management. From the definitions analyzed above it is clear that VM is not (Norton and McElligott 1995):

- A conflict orientated design review
- A cost cutting exercise
- A standardization exercise.

Therefore, this paper takes VM as a systematic process for improvement of value and not a method for cost cutting as identified above. If not properly handled VM could become what it is not supposed to be. Hence, it is important to maintain its process of application throughout.

### 2.2 How is best value achieved or improved

Three basic elements provide a measure of value to the user. These elements can be interpreted by the following (Public Seminar on Value Management (Institute of Engineers Sri Lanka), 2002) (Figure 2):

$$\text{Value} = \frac{\text{Function} + \text{Quality}}{\text{Cost}}$$

Where Function = The specific work that a design/ item must perform

Quality = The owner's or user's needs, desires and expectations.

Cost = The life cycle cost of the product.

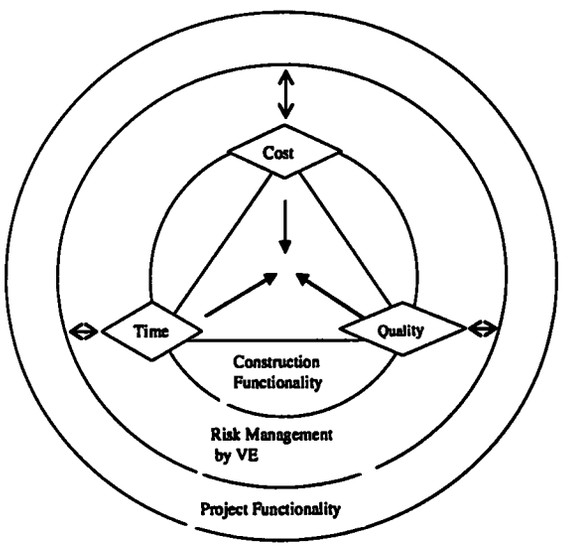



**Figure 2: Value Criteria – managing time, cost, quality, risk and Project functionality**

Therefore, value is the most cost effective way to reliably accomplish a function that will meet the user's need, desires and expectations. It was said by researchers that value methodologies may be applied at any point during the project development. But best results or best value is obtained through early application. Ideally the value process is used as early as the needs identification stage and is used for facilitating strategic partnering workshops including the development of dispute avoidance procedures (Philip 2002).

In order to achieve best options of value or opportunities, it is important to consider the strategic phase of project and project value chain (Male and Kelly 1992). Small or large, the client has a strategic plan for the project.The size,complexity,client requirements are some of the parameters for the strategic phase.

A project may also be influenced by its relationship to the asset base of the client. How best value could be achieved in project development is shown in figure 3.

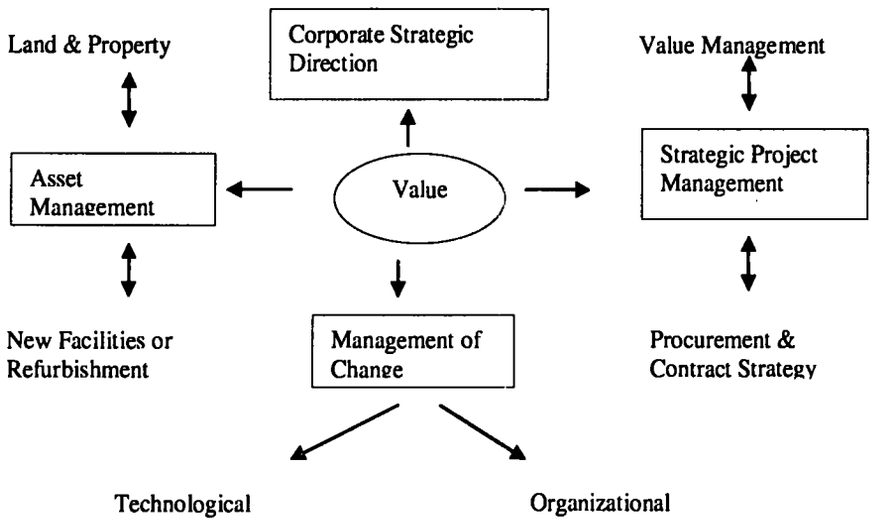



**Figure 3: Value context of project**

An organization comprises a series of internal and external strategically important activities that when combined provide it with an advantage over competitors (Porter 1985). This is termed as "Value Chain". Male & Kelly (1992) put forward the concept of the project as a value chain within a value management frame work, for understanding client organization's requirements at the strategic and tactical stages of a project. The project value chain concept was extended further by Standing (1999) to look at a project holistically, including the impact of procurement systems. (Figure 4)

The below shown value chain comprises three distinct major value systems: Client, Multi and User. These reflect major value transition points in any projects (Kelly, Morlrdge and Wilkinson 2002).

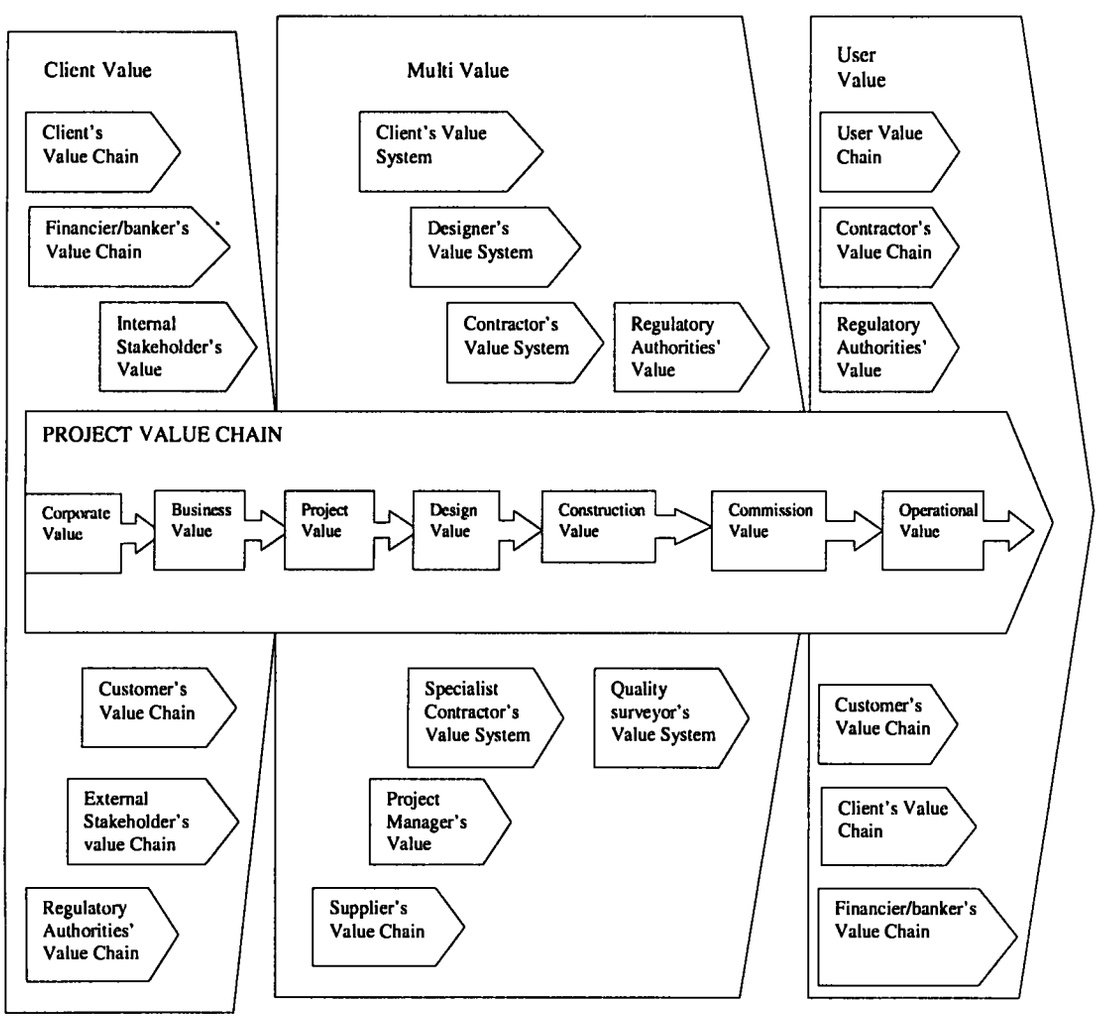



**Figure 4: Typical value system and value chain**

The idea of a project value chain is a useful concept for viewing:

- A network of projects as a series of strategically linked activities that must add value in order for the delivery process to meet the initial strategic requirement of the client.
- Strategically linked activities within a single project delivery process.

This necessitates best value being considered from multiple or single project perspectives.

### 2.3 The objectives of Value Management

The purpose of VM is to improve value and solve problems in context of objectives agreed for each specific assignment. It could be achieved through (Public Seminar on Value Management [IESL], 2002):

- Raising Productivity
- Improving Management.
- Improving Life Cycle Cost
- Improving Quality
- Simplifying Work
- Conserving Energy
- Reducing Paper Work
- Reducing Cost

### 2.4 The VM Phases

Different facilitators use different methodology for VM but it generally covers the following phases (Come de Leeuw 2001; Norton and McElliott 1995):

- Information phase

The initial segment of the study is devoted to developing a comprehensive understanding of the project and proposals. All relevant information pertaining to the project is gathered from all parties.

- Objectives phase

Using the data provided in the information stage as a platform, detailed analysis of the project is undertaken. The VM process focuses on the analysis of objectives, which the project must satisfy.

- Functional analysis phase

Functional analysis forces a broader and more comprehensive understanding of the project by stimulating intense discussion and by compelling the team to view aspects they might not normally have considered. Functional Analysis System Techniques (FAST) diagram is used as the technique for the evaluation of functions.

- Creativity phase

Concentrating on the objectives/functions identified during the previous phase, appropriate techniques are employed to assist the group to generate alternative ideas of achieving the required outcomes. In this segment of the study, the emphasis is on creating a large quantity of ideas with discussion and assessment held over to the next stage of the process. The creativity phase (brainstorming phase) is probably the most important phase of a VM exercise but it should be emphasized that all phases should be properly dealt with.

- Evaluation phase

It is during this phase that detailed assessment of possible alternatives identified during the creativity phase takes place. Ideas are examined from a range of perspectives including capital cost, recurrent/ maintenance costs, impact on service delivery, aesthetics, functionality and overall performance. Ideas to be recommended for implementation or for further investigation are identified with responsibility for such investigation allocated to the VM participants.

- Development phase

The ideas/alternatives identified in the evaluation phase are technically developed and analyzed during the development phase by the participants and/or members of the professional team.

- Reporting and recommendation phase

In this phase of the VM study the participants agree on the outcomes and recommendations flowing from the study and identify action necessary to keep the project on track and to meet key milestones. Each recommendation is to be tested against the objectives determined earlier.

### 2.5 Techniques of Value Management

This section analyses VM techniques in usages. (Come de Leeuw 2001; Norton and McElligott 1995). The appropriateness of each technique varies depending on the applications of VM.

#### 2.5.1 Functional Analysis System Techniques (FAST)

FAST diagrams are considered as one of the most successful in breaking existing paradigms of analysis of functions of a product or process. The technique promotes a historic view of projects with a view to understanding the customer's perspective of the finished product. It is a technique which uses a function diagram to illustrate the relationships and inter-relationships of all functions within a specific project or product or process.

#### 2.5.2 Generation and development of alternatives ideas to enhance value

There are tools and techniques to use when it is difficult to make a decision. One may, for instance, set up a "value tree" or draw up a "decision making matrix". The techniques categorized under this title consist of techniques that first weigh evaluation criteria according to their relative importance and then score alternatives on the basis of the weighted criteria to determine those that are optimal.

### 2.5.3 Life cycle costing & whole life costing

Life cycle costing is a tool to be used during the development phase of a VM study. Whole life costing assesses the cost of an asset over its lifetime. This takes into consideration initial capital costs, finance costs, operational costs, maintenance costs and replacement or disposal costs at the end of its life. In calculating whole life costs all future costs and benefits are brought back to a present day value through the use of discounting techniques.

### 2.6 The approaches for Value Management

The success of VM lies in its methodical approach. However the focus of VM is not on cost but function and optimum value for money. It is an ongoing process and should be used to review continuously all aspects of the project against customer needs. There are many customer benefits in using the whole project team and involving end users, as appropriate and if possible. These include the advantages of better teamwork throughout the project and users taking a stake in the end result. There are a number of pre-requisites to ensure a smooth running of the approaches such as, willing participation, management support, an appropriate study team and experienced facilitator.

There are many established procedures for VM. Those of the most popular approaches are discussed below ( Male and Kelly 1998; Norton and McElligott 1995):

### 2.6.1 The charette

This approach is undertaken at the end of the compilation of the brief, after the appointment of the design team but before design commences. Client representatives and the design team meet under the chairmanship of the value manager for one or two days. The value manager acting as chairman is termed the value management team coordinator (VMTC).

### 2.6.2 The 40 hour workshop

The 40 hour, five day workshop is the most widely accepted formal approach to value management and is seen as being quick and economical. It comprises the formation of a second design team to review the design at 35% of design or sketch design stage.

### 2.6.3 The Value Management Audit

This follows the same procedure as either a charette or the 40 hour workshop. Its objective is to give a corporate or public client a clear indication of the worth of a scheme or development inspired by a subsidiary. The parent organization may then appoint a value manager to carry out a charette in consultation with personnel from the subsidiary company and their design team. Alternatively, the parent company may appoint a value management team to carry out a full feasibility study after the proposed scheme has been developed to sketch design stage.

## 3. Guide to Research Tree

The previous sections examined briefly the VM process as applied in industry. This section and forthcoming sections will now focus mainly the research carried out by the authors. The research methodology, which was applied for this research, can be illustrated as follows (Figure 5):

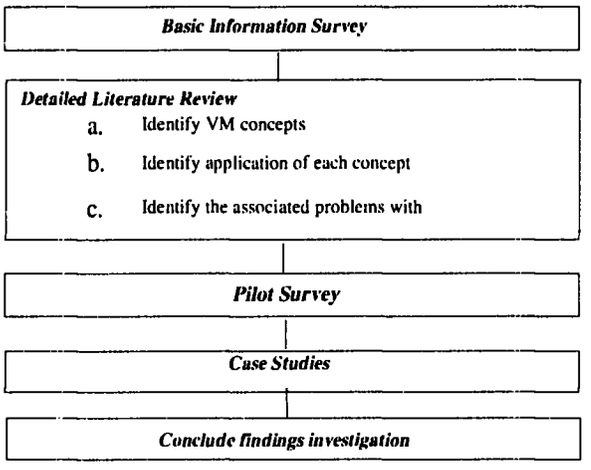



**Figure 5: Method of Study**

The stages identified above are explained in detail in the following sections.

### 3.1 Basic Information Survey

#### 3.1.1 Literature Review

A literature review was carried out to identify local as well as global view of Value Management practices, to develop a working knowledge of the physical process associated with the research under consideration. Through the literature review it is expected to identify the basic concepts, applications and problems associated with areas of VM process.

#### 3.1.2 Pilot Survey

To obtain industry-wide perspective of Value Management a survey will be carried out among the large-scale construction organizations operating in the Colombo metropolitan area. This is justified by the fact that these are the organizations that have the capability of investing on VM. The survey will cover different stakeholders such as clients, contractors and consultants of the construction industry. Semi-structured interviews will be carried out to collect the information on VM practices. This will enable the researchers to develop statistics as to the past status of VM application in Sri Lanka.

### 3.2 Case Studies

A systematic selection of case studies to achieve the objectives of research was adopted. Accordingly a total of six case studies were selected so as to correspond with the different VM stages of VP, VE and VA. For the

purposes of comparison and evaluation all the projects were carefully selected to fall within the same procurement method and within the Colombo metropolitan area.

The objective of the case studies is to illustrate the potential benefits of application of VM to project performance in terms of improvement in Cost, Time and Quality. It is hypothesized that the enthusiasm of the clients as well as the consultants will be aroused only by showing the benefits of VM in a practical manner. Except the project on value engineering stage (on-going project) all the other case studies are planned to be carried out with the use of in-house resources. A real VM workshop will be conducted by the researchers in order to get the actual inputs from the team.

### 3.3 Conclude findings investigation

Analyse the findings of investigations and introduce a procedure for application of Value Management to the construction industry.

### 3.4 Benchmarking

The term benchmarking has been adopted when the comparator is regarded as the best available. Benchmarking compares a snapshot of performance at a particular point in time. This indicates the current performance and the inherent potential for future performance.
In the above case studies the original time, cost and quality targets are taken as benchmarks.

- Time: The project duration established originally is taken as the benchmark for comparison. That is to identify time saving that can be achieved by the application of VM or to complete the project within the specified time period even after application of VM.
- Cost: The budgeted cost is compared with the analyzed figure achieved through the application of VM.
- Quality: Quality is a subjective measure. Therefore it is proposed to use the VM process as a quality assurance process that will ensure achieving required quality targets. Further, the method of procurement can affect quality of projects. Hence case studies having the same procurement methods were selected.

## 4. Current Status of Value Management in Sri Lanka

As discussed above, an enormous contribution to the economy of Sri Lanka can be achieved through the construction industry. When comparing with other countries, in Sri Lanka the application of VM in construction organizations is relatively new. At present a very few instances of application of VM can be found in the industry. Eg: A VM study was done to the project of World Trade Centre (Colombo) throughout the project. After occupation also there were some studies carried out for energy saving, increased productivity in business, etc. by some consultants related to the same project.

According to research carried out by SAVE, application of VM ensures a minimum of 30% cost saving in projects (www.value-eng.org). However there are no such statistics available for the Sri Lankan industry. Further research by the authors hope to develop case studies primarily in terms of value analysis related to construction projects in Sri Lanka.

### 4.1 Reasons for the absence of Value Management

The initial studies and investigations indicate that there is very little evidence on application of VM in the construction industry of Sri Lanka. There are various reasons for the absence of Value Management in the Sri Lankan construction industry. A main factor could be the greater fragmentation of the industry.

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. Following are some factors that can be highlighted as potential factors to this situation:

- A key fact is that professionals do not share a common design environment. Furthermore, they have been educated separately in their isolated disciplines and accustomed to working independently.
- According to the traditional contract 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 architect, traditionally the consultant team leader, often takes an insufficiently detailed brief.
- The Architect then interprets the client's brief according to his own design parameters, still without the benefits 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 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.
- No guidance or knowledge about the benefits of VM among the clients, developers, etc.

**4.2 Research findings**

Value Management opportunities commence at the inception of the project and continue through the project's life. The researchers have selected six projects for this research at different stages of construction process (Value Planning stage, Value Engineering stage and Value Analysis stage). Two projects are taken into analysis at each stage (Table 1).

**Table 1: Projects considered for case studies**

| Project | Location | Project Cost | Project Time | Project Stage | VM Stages |
|---|---|---|---|---|---|
| Hospital | Maharagama | 360 Million (Preliminary estimate) | | Briefing | VP |
| Auditorium & Office for Church | Nugegoda | 60 Million (Preliminary estimate) | | Briefing | VP |
| Proposed House | Piliyandala | 38 Million (or 3.8) | 12 months | Project Evaluation | VE |
| Proposed Apartment Complex | Colombo 5 | 110 Million | 18 months | To be Awarded | VE |
| Shopping Mall | Battaramulla | 90 Million | 15 Months | Completed | VA |
| Show Room & Office | Colombo 5 | 80 Million | 16 Months | Completed | VA |

There are various triggers for a Value Management exercise. Following are identified as triggers for VM (Kelly, Morlridge, and Wilkinson, 2002):

- The enthusiasm/ interest of the researchers in the application of VM
- The planning of a complex construction operation
- An overspent budget
- Providing basic knowledge to investors, developers and construction consultants
- Educating consultants in application of VM
- As a developing country VM programme gained enormous benefits.

The following are some of the projects completed in Colombo area during the period of 1999 to 2002. The budgeted cost and the estimated time period are tabulated below for easy reference (Table 2).

**Table 2: Examples of time & cost overruns**

| Project Description | Budgeted Cost | Estimated Time | Project Cost on Completion | Project Period |
|---|---|---|---|---|
| 1.Shopping Mall | 70 Million | 12 Months | 90 Million | 15 Months |
| 2.Showroom & Office | 65 Million | 10 Months | 80 Million | 16 Months |
| 3.IT Park | 325 Million | 18 Months | 365 Million | 22 Months |
| 4.Proposed House | 7 Million | 2 Months | 10.2 Million | 12 Months |
| 5.Office Complex | 32 Million | 8 Months | 40 Million | 12 Months |

This table above illustrates the status of severe cost and time overruns encountered by most projects in Sri Lanka. When analyzing the reasons for the Time and Cost overruns on the above projects the following were revealed:

- Heavy design changes
- Structural inputs and the solutions for structural problems very poor
- Poor coordination between the Architect, Structural and mechanical and electrical Consultants. Less chance for the Contractors' inputs
- No study taken place for life cycle costing,

At the heart of all these problems is the fact that there is poor consideration of functional requirements of the project at the project initiation stage or even at the

construction stage and the lack of understanding of client requirements well in advance. These are fundamental factors that could be overcome by the application of VM process.

The main constraints in application of VM in the Sri Lankan construction industry can be identified as:

- Lack of support from Clients.
- Designers don't like to change their initial design concept.
- There is no standard procedure available for VM process in Sri Lanka.
- The construction industry regulatory body (Institute of Construction Training and Development) does not actively encourage the practice of VM in their documentation, advice or guidance on projects.

Since the research is in progress at this stage it is a little difficult to predict what would be the final output. Hence the researchers feel a good system or procedure could be introduced to the construction industry for the application of VM.

## 5. VM benefits Globally

According to research carried out by SAVE, VM methodology can increase customer satisfaction and add value to an organization's investment in any business or economic setting (www.value-eng.org).VM practitioners apply VM methodology to products and services in industries such as the following: corporations and manufacturing, construction, transportation, government, health care and environmental engineering. Further from the research they found out that VM methodology easily produces savings of 30 % of the estimated cost for manufacturing a product, constructing a project or providing a service. The return on investment that public and private organizations derive from implementing VM programs averages 10 to 1. That is, for every dollar invested in a VM study, including participants' time and implementation costs, 10 dollars in net saving results.

The following are some of the results of Value Management application by some agencies (Table 3) (Public Seminar on Value Management [IESL], 2002):

### 5.1 Benefits of VM in Construction

Benefits of VM highlighted by design consultants included (Corne de Leeuw 2001):

- Proof that the initial design was indeed the best.
- The owner was receiving good value for money.
- Introduction of higher quality products.
- Best up-to-date technology at lowest cost.
- A clear focus on project objectives.
- Several alternatives for the design being considered.

Additional advantages highlighted by contractors' included:

**Table 3: Results of VE Programmes**

| Agency | Annual Approximate Expenditure (Million US$) | Period | Annual Programme Cost (Million US$) | Annual Saving (Million US$) | % Saving |
|---|---|---|---|---|---|
| EPA | 1,100 | 1981-Present | 3-5 | 30 | 2-3 |
| Federal Highways | 10-20,000 | 1981-Present | Varies Widely | 150-200 | 1.5 |
| Crops of Engineers | 3,400 | 1965-Present | 3 | 200 | 5-7 |
| Naval Facilities-Engineering Command | 2,400 | 1964-Present | 2.5 | 100 | 3-5 |
| Veterans Administration | 200 | 1988-Present | 0.5 | 10 | 3-5 |
| School Facilities-State of Washington | 200 | 1984-Present | 4 | 5-10 | 3-5 |
| Office of Management - and Budget, NYC | 2,000<br>1,700 | 1984- 87-88<br>Present | 1 to 1.5 | 80<br>200-400 | 3-5<br>10-20 |
| Design & Construction - United Technology | 300 | 1984-1985 | 0.5 | 36 | 12 |
| GDMW-MODA Saudi Arabia | 2000 | 1986-Present | 3 | 150 | 5-10 |

- Improved project programs.
- Improved site management structures.
- Reduced waste.
- An opportunity for a detailed analysis of the required project.

In terms of disadvantages the majority of respondents' comments related to the design programme and the contract period.

### 5.2 How to improve the knowledge of VM in Sri Lanka context

Following are some directions for the improvement of usage of VM in Sri Lanka:

- Conducting Seminars and educating the industry.
- Perform some workshops on very low cost initially.
- Conduct short courses on VM.
- Implement some regulation for application of VM for some projects (make it mandatory for public sector investment projects).
- Introduce any regulatory body to observe and regulate the application of VM.
- Follow up and get the knowledge from other developing countries as to how they are successful in application of VM.

Above is not a comprehensive list of action but a possible action list. The researchers intend to elaborate on these aspects towards the completion of the project.

## 6. Conclusion

Value Management is a structured, systematic, flexible, team oriented approach for assessing the relationship between function, cost and worth (Albert and Betty, 1996).The philosophy of Value Management is based on the premise that a certain amount of unnecessary cost is inevitable in building design due to the inherent complexity of the process and that significant cost savings can therefore be achieved by the identification and subsequent elimination of unnecessary cost.

VM has worked successfully in the US, UK, Australia and many other developed countries, either under the name of value engineering, value analysis or value planning. The absence of proper cost control techniques such as cost planning in the construction industry of Sri Lanka further exacerbates the need for Value Management in Sri Lanka. However it is still a relatively new concept in Sri Lanka. Thus the main theme of this paper was to introduce the application of Value Management to the Sri Lankan construction industry and to highlight potential benefits of it.

### Reference


**Austin, S.A. and Thomson, D.S.** (2001), *Construction Value Management revisited:The designer's role*, Glasgow Caledonian University, Glasgow, UK.

**Albert, P.C. Chan and Betty, P.M. Ho** (1996), *Value Management in Construction*, Journal of Building Economist , AIQS, Austraila.

**Department of Statistics** (2002), *Central Bank Annual Report,* Central Bank of Sri Lanka, Sri Lanka.

**Department of Census & Statistic** (2002), *National Account of Sri Lanka,* Ministry of Finance & Planning, Sri Lanka.

**Department of Census & Statistic** (2002), *Sri Lanka Labour Force Survey Report,* Ministry of Finance & Planning, Sri Lanka.

**Institute of Civil Engineers** (1996), *Creating Value in Engineering Projects*, Thomas Telford, London.

**Winch** (2000), *Engineering Project Management*, Blackwell Publishing, UK.

**British Research Establishment Ltd.** (BRE), (1997), *Value from Construction: Getting started in Value Management,* British Research Establishment Ltd. (BRE), UK.

**CCL & E H Harris**, Value Management http:// www.cclcon.com

**Michel, T.** (2001),*Will the European Value Management Standard change the way we practice?* Proceedings of the PMI Europe , London.

**Fong, et al.** (1998), *Applications of Value Management in the Construction Industry in Hong Kong,* Department of Building and Real Estate,University of Polytechnic , Hong Kong.

**Green, S. and Popper, P.** (1990), *Value Engineering – The Search for unnecessary cost,* The Chartered Institute of Building, Ascot.

**Society of Ameican Value Engineers (SAVE)** www.value-eng.org.

**Norton, B. R. and McElligott, W.C.** (1995), *Value Management in Construction - a practical guide,* Macmillan Press, London.

**Institute of Engineers Sri Lanka** (2002), *Public Seminar on Value Management,* Sri Lanka.

**Phillip, M.** (2002), *A value and risk management approach to project development*,New Civil Engineering International, London.

**Male, S.P. & Kelly, J.R.**(1992), *Value Management as a strategic management tool in: value and the client,* Royal Institution of Charted Surveyors.

**Porter, N.E.**(1995), *Competitive advantages, creating & sustaining superior performance*, Free Press,UK.

**Kelly, J. , Morlridge, R. and Wilkinson, S.** (2002), *Best Value in Construction,* Blackwell Publishing, UK.

**Standing, N.**(1999), *Value Engineering and the contractor*, unpublished PhD thesis, University of Leeds.

**Corne P. de Leeuw.** (2001), *Value Management: An Optimum Solution*, International Conference on Spatial Information for Sustainable Development, Kenya.

**Male, S.P.and Kelly, J.R.** (1998), *A study of Value Management and Quantity Surveying Practice*, London: Surveyors Publications, RICS.