

**VALUE MANAGEMENT IN THE
CONSTRUCTION INDUSTRY:
WHAT DOES IT ENTAIL AND IS IT
A WORTHWHILE PRACTICE?**

LIZA COETZEE

**VALUE MANAGEMENT IN THE CONSTRUCTION INDUSTRY:
WHAT DOES IT ENTAIL AND IS IT A WORTHWHILE PRACTICE?**

By: Catharina Elizabeth Coetzee

25201116

Submitted in fulfilment of part of the requirements for the
Degree of BSc (Hons) (Quantity Surveying)

In the Faculty of Engineering, Built Environment and
Information Technology



**UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA**

Study Leader

Mr. J.H. Cruywagen

October 2009

DECLARATION BY STUDENT

I, the undersigned, hereby confirm that the attached treatise is my own work and that any sources are adequately acknowledged in the text and listed in the bibliography

Name of student: Catharina Elizabeth Coetzee

Signature of acceptance and confirmation by student

Date

ABSTRACT

Title of treatise : Value management in the construction industry:
what does it entail and is it a worthwhile practice?
Name of author : Miss C.E. Coetzee
Name of study leader : Mr J.H. Cruywagen
Department : Faculty of Engineering, Built Environment and
Information Technology
Date : October 2009

Value management has been practised for many decades already, yet in South Africa most built environment professionals are only vaguely familiar with value management and do not realise the benefits of this practice and that it can be a value adding service to the client.

This treatise will familiarise the reader with what value management truly is. It will cover topics like the definition and description of value management, projects that will benefit the most from value management, the stages involved in a proper value management session, the facilitation process of a value management workshop and the role of the workshop facilitator. The second part of this treatise aims to prove that value management is a truly beneficial and worthwhile practise. The benefits and costs of value management are weighed up against each other and the importance of value management as an integrated practice is investigated as well as the introduction of value management into the curriculum of courses related to the built environment industry.

ACKNOWLEDGEMENTS

I would like to thank our Lord and Saviour for His abundant blessings regarding my studies. I owe a great deal of gratitude to Doctor Corné de Leeuw who contributed greatly to the quality of the end product. Sincere thanks are also due Mr Felix le Roux for his intellectual inputs and assistance in helping to obtain quality information for this treatise.

TABLE OF CONTENTS

	Page
DECLARATION BY STUDENT	i
ABSTRACT	ii
ACKNOWLEDGEMENTS	iii
CHAPTER 1	
INTRODUCTION AND BACKGROUND	
1.1 Introduction and brief overview of VM	1
1.2 Statement of the main problem	2
1.3 Hypothesis of main problem	3
1.4 Statement of the sub problems and their hypotheses	3
1.5 Delimitations of research	5
1.6 Terms and definitions	5
1.7 Assumptions	6
1.8 The importance of the study conducted	7
1.9 Research methodology used	8
CHAPTER 2	
WHAT IS VM, WHEN IS THE BEST TIME TO IMPLEMENT IT AND WHICH CONSTRUCTION PROJECTS WILL BENEFIT THE MOST?	
2.1 Introduction	11
2.2 What exactly is VM and what does it entail	11
2.2.1 The definition of VM	11
2.2.2 Test for authentic VM	14
2.2.3 The difference between VM and cost management	15
2.2.4 Life cycle costing	16
2.2.5 Pareto's law of maldistribution	17
2.2.6 Factors to consider before initiating a VM study	17
2.3 When is the best time to implement VM on a project?	18
2.3.1 Who can initiate a VM study?	18

2.3.2	At what project stage can VM be implemented?	19
2.3.3	When is the best time to implement VM on a project?	22
2.4	Which types of projects benefits the most from VM?	22
2.4.1	What types of projects are most suitable for VM?	23
2.4.2	VM as a statutory requirement in other countries	25
2.5	Summary and conclusion	25
2.6	Testing of hypothesis	26

CHAPTER 3

WHAT ARE THE DIFFERENT STAGES INVOLVED IN A PROPER VM SESSION?

3.1	Introduction	27
3.2	Seven phases of a proper VM session	28
3.2.1	Pre-study phase	28
3.2.2	Information phase	32
3.2.3	Creative phase	35
3.2.4	Evaluation phase	37
3.2.5	Development phase	39
3.2.6	Presentation phase	40
3.2.7	Post study phase	41
3.3	Summary and conclusion	42
3.4	Testing of hypothesis	43

CHAPTER 4

WHAT IS THE ROLE OF THE VM FACILITATOR AND WHICH PERSON IS BEST SUITED FOR THIS TASK?

4.1	Introduction	44
4.2	Roles and responsibilities of the VM facilitator	44
4.2.1	Guidance and creative thinking techniques	45
4.2.2	Structuring the process	45
4.2.3	Recognition of valuable ideas	45
4.2.4	Deferring judgement	45
4.2.5	Creating a conducive environment	46

4.2.6 Recording	46
4.3 Skills required by the VM facilitator	47
4.4 Appointment of an internal vs. An external facilitator	49
4.5 Training of facilitators	51
4.6 The role of the quantity surveyor in VM	52
4.7 Summary and conclusion	53
4.8 Testing of hypothesis	53

CHAPTER 5

HOW IS VM AN INTEGRATED PRACTICE & SHOULD VM FORM PART OF THE CURRICULUM OF COURSES RELATING TO THE BUILT INDUSTRY?

5.1 Introduction	55
5.2 VM, an integrated practice	55
5.2.1 Life cycle costing	56
5.2.2 Risk management	56
5.2.3 Lean construction	57
5.2.4 Total asset management	58
5.2.5 Project management	58
5.2.6 Management styles	58
5.2.7 Knowledge management	59
5.2.8 Sustainability	59
5.2.9 Best value tendering	60
5.2.10 Cost management	60
5.3 VM being taught at educational institutions	60
5.4 Summary and conclusion	63
5.5 Testing of the hypothesis	64

CHAPTER 6

WHAT ARE THE COSTS AND BENEFITS ASSOCIATED WITH VM AND HOW CAN VM BE IMPROVED?

6.1 Introduction	65
6.2 The benefits of a VM study	65

6.2.1	Financial benefits of VM	66
6.2.2	Secondary and unquantifiable benefits of VM	67
6.3	The costs and risks associated with VM	68
6.3.1	Possible risks involved with VM	68
6.3.2	Financial and other costs involved in VM	69
6.4	Method to improve VM and to minimise associated risks	72
6.4.1	Electronic VM as way forward	73
6.4.2	Establishing a group support system	74
6.4.3	Developing a knowledge management system	73
6.4.4	Developing a performance measurement framework	75
6.4.5	Using value added/based strategies	76
6.5	Summary and conclusion	76
6.6	Testing of hypothesis	77

CHAPTER 7

CONCLUSION

7.1	Background on main problem	78
7.2	Summary of treatise	79
7.3	Conclusion	81
7.4	Recommendations for further study	84

BIBLIOGRAPHY	86
---------------------	----

ANNEXURE A - VM QUESTIONNAIRE

ANNEXURE B - EXAMPLE OF VM WORKSHOP AND REPORT

LIST OF TABLES

Table 1:	Value management study levels	21
Table 2:	Internal versus external facilitation	50
Table 3:	Summary of skills and competencies of a typical quantity surveyor	52

LIST OF FIGURES

Figure 1: Elements of Value	13
Figure 2: Main reasons for carrying out VM	19
Figure 3: Cost reduction potential versus cost to implementation changes	23
Figure 4: Value methodology workshop process	28
Figure 5: A typical fast diagram	35
Figure 6: Lean construction	57
Figure 7: VM knowledge management system	59
Figure 8: Opportunities and potential saving through VM	67
Figure 9: Cost of VM versus project costs	72
Figure 10: A framework of GSS support to VM studies	75

1.

INTRODUCTION AND BACKGROUND

1.1 Introduction and brief overview of value management

Value management (VM) in broad terms according to Kelly et.al (1993:1) is a service which maximizes the functional development from concept to completion, through the comparison and audit of all decisions against a value system determined by the client or customer. The discipline of value management is currently attracting more and more attention in the construction industry. Clients are increasingly enquiring and demanding that it is used during the key stages of their construction projects. It is not difficult to see why. There exists even greater competition in the market place than ever before, therefore it is vital that resources are applied as efficiently as possible and waste in any form reduced to a minimum.

According to McElligott and Norton (1995:4) the original concept of VM originated in the USA during the Second World War at a company named "General Electric Company". Priority "war production" resulted in shortages of raw materials and companies were forced to use substitute materials. Over time it became evident that this forced substitution often resulted in improved product performance and costs were also lower in most instances. The basic philosophy of value management as stated by The College of Estate Management (1994:5) was therefore to eliminate costs which did not contribute to the performance of the required function. This concept was further refined and started to spread throughout the USA manufacturing industry. Today it is a well known practice which is almost deemed to be part of the construction process in certain other developed countries like the UK, USA, Canada and Australia. Hong Kong is also

catching on quickly. Although the built environment professionals in these countries have a similar makeup and background as their South African counterparts, VM seems to be a non-starter in this country. Unfortunately in South Africa the benefits of VM have not been realized yet by all in the construction industry.

This research is directed towards the identification of the benefits of VM and the general processes involved with VM. It aims to create awareness of VM, to broaden the interpretation of value and encourage built professionals to make use of it on construction projects, especially larger and more complex projects.

1.2 Statement of the main problem

Value management in the construction industry: what does it entail and is it a worthwhile practice?

The main purpose of this treatise is to assess and to establish whether or not VM for construction projects is really necessary or is it merely a time consuming and futile practice. Another objective of this treatise is to enlighten the reader to what VM really means, where and when it can be optimally used, the facilitation thereof and processes and steps involved. VM as part of the curriculum of courses relating to the built industry will briefly be assessed. To ultimately discover whether or not VM is a worthwhile practice, the treatise will report on the costs and benefits of VM and how the VM process can be improved. It is important also the look at how VM is an integrated practice to increase its credibility.

1.3 Hypothesis of main problem

Value management is an integrated, organised and structured process, led by an experienced facilitator and broken down into various stages to enhance the value of a construction project, not necessarily only by cutting costs. The benefits of having a VM session on a project outweigh the costs by far, more so if it is implemented in the early development phases of a construction project and for larger more complex projects. Methods to improve VM exists which even further eliminates the costs associated with VM, making it even more viable.

1.4 Statement of the sub problems and their hypotheses

1. What exactly is VM, when is the best time to implement it and will it be beneficial on smaller construction projects?

Hypothesis:

VM is a systematic multidisciplinary effort made to enhance the value of a construction project in many other ways than just cutting on costs. The best time to implement it is in the early development phases on a project. Optimal benefits will be obtained on larger and more complex projects.

2. What are the different stages involved in a proper value management session?

Hypothesis:

The most commonly used stages and phases into which VM is divided is the following:

- Pre-study phase
- information stage

- creative phase
- evaluation phase
- development phase
- presentation phase
- post-study phase

3. What is the role of a VM facilitator and which person or built environment professional is best suited for the task?

Hypothesis:

The facilitator must orchestrate the professionals and team members all with their divergent backgrounds, interests and objectives. The facilitator must guide and enable the proceedings rather than dictate the process and the participants' way of thinking. An outsider to the project, but still a built environment professional would be the best facilitator because he or she will be the most objective.

4. How is VM an integrated practice and should VM form part of the curriculum of a course related to the built environment industry?

Hypothesis:

VM is not an 'alone-standing' practice and a lot of other management and construction partnering techniques and collaborative working are incorporated into VM. Students should be introduced to VM during their time of studying a course related to the built environment industry to make VM more successful.

5. What are the costs and benefits of VM and how can VM be improved?

Hypothesis:

VM is a lengthy process in an industry where time is money, but it has many great advantages making the two-day sessions well worthwhile. VM can be

improved by better communication strategies, information circulated between the project team members and stakeholders that is of a higher quality in general and using the correct methodology.

1.5 Delimitations of research

Value management as such is a generic term that can be applied to any project, scenario, organization etc. This research studies VM applied specifically in the construction industry and to construction projects. This treatise primarily aims to reach the South African built professionals, therefore interviews were only conducted with South African professionals. This study considers global VM principles and practices due to the fact that VM in South Africa stems from it.

1.6 Terms and definitions

Abbreviations:

- eVM : Electronic value management
- GSS : Group support system
- FAST : Functional Analysis Systems Technique
- PVM : Professional in value management
- QS : Quantity Surveyor
- SA : South Africa
- TAM : Total asset management
- VE : Value engineering
- VM : Value management

Definitions:

- Function analysis: Method of analysing the functions of the constituent parts of a project. A core technique in VM is changing the focus from what things are to what they do (www.ivm.org.uk/vm_sector_building.htm, access 24/02/2009)
- Stakeholders: Individuals or organisations with an interest in the conduct or outcome of a project (www.ivm.org.uk/vm_sector_building.htm, access 24/02/2009)
- Value analysis: Title given to value techniques applied retrospectively to completed projects to “analyse” or audit the projects’ performance (Norton, et.al 1995:7-8)
- Value engineering: Title given to value techniques applied during the ‘engineering’ phase of the project (Norton, et.al 1995:7-8)
- Value planning: Title given to value techniques applied during the ‘planning’ phase of a project (Norton, et.al 1995:7-8)
- Workshop: A formal facilitated event, involving multiple stakeholders and disciplines, taking participants through a structured process to a prescribed outcome (www.ivm.org.uk/vm_sector_building.htm, access 24/02/2009)

1.7 Assumptions

An assumption was made that VM is not a widely used practice in South Africa. This was based on a general feeling and from interviews conducted. The statistical data obtained that suggests the above assumption, is inadequate and proper research still needs to be conducted to verify this assumption.

1.8 The importance of the study conducted

“Value management plays a key role in the construction industries’ quest for continuous improvement and innovation” (The Institute of Value Management. Value management in Building and Construction http://www.ivm.org.uk/vm_sector_building.htm, access 24/02/2009). Nowadays, not only South Africa, but the whole world is facing very tough economic challenges. It is more important now than ever before to work wisely with the resources you have and to optimise value for money and inputs. This is where VM comes into play.

In South Africa VM is not yet a concept well known and practiced by all the parties involved in the building industry. This study hopes to prove that VM is truly beneficial and a worthwhile practice to enhance the value of any building project. It is important for South African built professionals to become aware of and familiarise themselves with VM. We are a few steps behind with VM compared to some of the developed countries like Britain, Australia, North America and China.

This study on VM will specifically address VM in South Africa and should ideally serve as an eye opener to any person, but more specifically directed towards a built professional, who reads it and make him or her curious enough to investigate the subject further and ultimately implement it on a construction project. Hopefully after reading this treatise the reader will be convinced that practising VM on a project is viable and can become a value adding service to the client.

1.9 Research methodology used

Following are a list of all the resources that will be consulted and used to conduct the study on VM in South Africa.

Textbooks:

Various textbooks obtained from the Merensky library of the University of Pretoria library was consulted. Textbooks are a rich source of information and some books go into a lot of detail on a specific subject. Unfortunately some books are outdated, due to new and more current research constantly being conducted. Books that were published before 1985 was only used for additional reading and as a secondary source of information.

Journals and articles:

Journals contain insightful information which is approved before it is published. Therefore the information contained in a journal will mostly be responsible and factual. Only more recent journals and articles, not older than five years was consulted in order to get a picture of the current position of VM in the world and in South Africa. Much of the information in this treatise was derived from journals.

Internet sources:

The internet is probably the fastest method to obtain a multitude of information. The information was filtered first to check for its accuracy and information from sites that are not secured and which generally contradicts other trustworthy sources was not used. Various search engines were used to extract current and relevant information that was required for the conduct this study.

Institutional documents:

Information on VM in general was obtained from the Institution of Value Management which is a UK based institution. Institutions are usually very helpful

in providing interested parties with information or any other services pertaining to the subject.

Academic dissertations and theses:

Professor Roelf Vissers' doctoral treatise was obtained. It investigated whether a Quantity Surveyor is suitable to become a VM facilitator and he also discussed VM in broad terms. His treatise was consulted to help solve one of the issues in the sub problems regarding the role of the facilitator. Class notes (1st year BSc. Quantity Surveying Honors) mainly by Professor CE Cloete will also serve as an additional source of information.

Human information resources:

Various interviews with key persons in the built environment industry which were identified before hand were conducted. Amongst them were Dr CP de Leeuw, a well known Quantity Surveyor who has attended and facilitated many VM workshops in the past. He has a lot of experience and knowledge which was valuable to the compilation of this treatise.

Questionnaires were drawn up to address specific problems and queries and to support the hypotheses. The questionnaires were mostly given to specific professionals in the built industry identified beforehand. The idea was to hand out approximately 65% of the questionnaires to people that had a moderate to high level of knowledge about VM and about 35% to people who were not very familiar with VM. Some "homework" was done beforehand on which people would have some knowledge of VM. The reason for this is that some of the questions that were asked were specifically for someone that has participated in VM before. Twenty three good responses were obtained. Out of the twenty three questionnaires successfully completed, fourteen questionnaires were personally handed to persons ranging from architects to engineers, project managers etc. The questions were explained and a short informal interview was conducted revolving around the questionnaire or other issues or problems addressed in this

treatise. The answers of the questionnaires and interviews were evaluated and are incorporated into the relevant chapters. An example of the questionnaire will be included in annexure A.

Practical experience and evaluation of case studies:

For the purposes of this study a short abstract of the outcomes of one VM workshop that was recently conducted in SA was analysed and some other administrative documents pertaining to that specific session. It will be included in annexure B. This was done to draw conclusions to whether the VM session was beneficial or not and how many useful recommendations were obtained.

2.

WHAT IS VALUE MANAGEMENT, WHEN IS THE BEST TIME TO IMPLEMENT IT AND WHICH CONSTRUCTION PROJECTS WILL BENEFIT THE MOST?

2.1 Introduction

This chapter intends to introduce the concept of VM to the reader. It will look at the different definitions, perceptions and some misconceptions that people commonly have about VM. Value management is sometimes confused with cost management. The difference between these two practices will be explored in more detail. Other relevant topics relating to VM, for example life cycle costing etc will be briefly looked at. The different project stages at which it is possible to implement VM are summarised together with the activities required in each phase. The optimal phase in which VM should be implemented is very important and attention will be given to provide a suitable answer to that question as well as the types of projects which will benefit the most from VM.

2.2 What exactly is VM and what does it entail?

2.2.1 The definition of VM

It is important to point out that there are some schools of thought which tend to distinguish VM from value engineering and value analysis. However the leading professional organisation for VM, SAVE International, treats these three terms

synonymously. To simplify matters, the term VM will be used in this treatise throughout and not value engineering or value analysis.

There are various definitions for value management which all basically says the same but just in different words. Here follows some of the definitions that are commonly used to describe the term “value management”:

- The Australian and New Zealand Standard AZ/NZS 4183:1994 defines VM as “a structured, and analytical process which seeks to achieve value for money by providing all the necessary functions at the lowest total cost consistent with the required levels of quality and performance.”
- “Value management is a systematic and structured process of team based decision making. It aims to achieve best value for a project by defining those functions required to achieve the value objectives and delivering those functions at the least cost (whole life cost or resource use), consistent with the required quality performance” (www.alabc.org.uk, access 13/03/2009)
- Norton (1995:11) describes VM as a systematic, multi-disciplinary effort directed towards analysing the functions of projects for the purpose of achieving the best value at the lowest overall life cycle costs.

The latter definition can be broken down further into five keywords or phrases namely:

- **Systematic process:** It has a definite beginning and end and it differs from cost reduction exercises which are normally unstructured and conducted in an informal way. This process is referred to as the job plan which consists of a sequence of steps that guide the VM team through the problem solving process. This process is discussed in greater detail in chapter three.
- **Multi-disciplinary effort:** A group of individuals are brought together to analyse all aspects of the project that are studied. They all work together as a group under the leadership and guidance of the VM facilitator. Most

projects make use of various disciplines because no one individual is an expert in every area of the construction project.

- **Functions:** Function analysis is at the heart of VM and this is what separates VM from other “cost cutting” programs. With normal cost cutting exercises the question of what it is and what else can be used are asked. But in VM the question of what does it do and what is the function that it seeks to achieve is asked. VM must be undertaken without compromising the quality, reliability, safety and aesthetic features that the client requires.

- **Value:** The main function of VM is not to reduce costs but to improve value. Value is made up by balancing cost, time and function/quality of the product/project. Value can also be seen as the benefit the client or the occupants of such a building or structure enjoys. According to Norton (1995:14) there are three major ways to improve value by applying VM.
 1. To provide for all the required project functions but at a lower cost
 2. To provide additional functions without increasing the cost
 3. To provide additional functions and at the same time to lower the cost

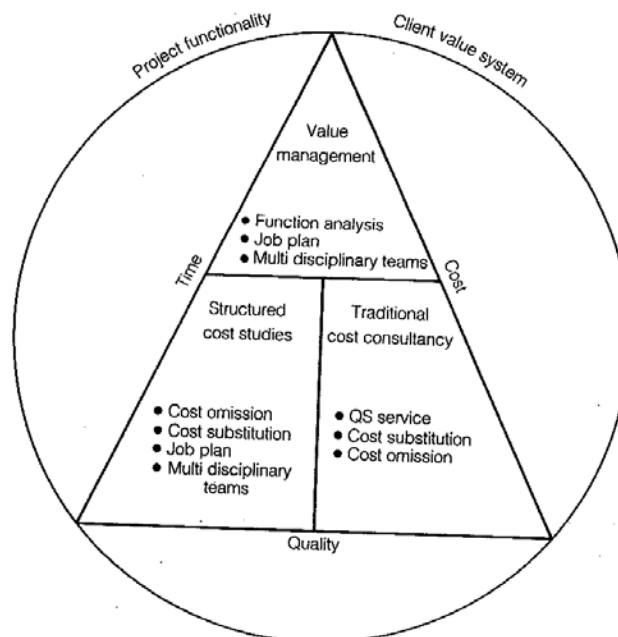


Figure 1. Elements of Value (Source: Kelly, 1993:159)

- **Life cycle costs:** It is the present value of the total cost of the building/asset over its entire operating life and includes the initial capital and construction costs, operating and maintenance costs and the cost or the benefit of eventual disposal of the asset.

VM can be defined in so many different ways but what it boils down to is that it is a service which maximises the functional value of a project by managing the development of such project from the concept stage right through to completion. It is an organised approach to identify and eliminate unnecessary cost which is any aspect of the project which provides neither use, nor life, nor appearance or customer features to the project. All decisions are examined against a value system determined by the owner or developer of the project.

2.2.2 Test for authentic VM

People are often very quick to use the term “value management”. You will hear someone tell the client “don’t worry we will quickly value engineer/manage the project”. To test for authentic VM there are four criteria which must be satisfied. In short they are the following

- 1.) VM must follow an approved job plan
- 2.) It should involve a multi-disciplinary team working together at the same place and time
- 3.) The VM study must be led by a skilled/qualified facilitator (the UK has a certification procedure)
- 4.) VM does not pursue any design changes which are not in line with the projects required basic functions. This is where the functional analysis technique is used.

According to the CP de Leeuw (1998:W1-1) working manual VM is not:

- A conflict orientated design review
- A cost cutting exercise

- A standardisation exercise

2.2.3 The difference between VM and cost management

Many confuse VM with mere cost reduction on a project. There is a fundamental difference which should be noted. Keeping costs low that has been commonly applied with traditional cost management is not enough. There is an increasing need for more efficiency, especially in the current competitive market conditions. Kelly (1993:72) defines VM as “a service which utilises structured functional analysis and other problem solving tools and techniques in order to determine explicitly a client’s needs and wants related to both cost and worth” compared to cost management which he describes as “a service that synthesises traditional quantity surveying skills with structured cost reduction or substitution techniques using a multi-disciplinary team.”

Cost management does not make any major changes to the scope and concept of a project whilst VM looks holistically at the project as a whole and scope changes are often considered when conducting a VM study. The key differences are that VM is positive. It focuses on the value rather than the cost, seeking to achieve a balance between quality, life cycle costs and time. VM is also structured, accountable and seeks to maximise the creative potential of all project participants. (www.ogc.gov.uk/ppm_documents_construction.asp, access 25/02/2009)

Both VM and cost management are important on a project and there are important links between them. When these two activities are combined the total combined effect is bigger than the sum of the individual effects. Cost management enhances VM in several ways such as for example it is the quantity surveyor who provides cost management that also produces the cost data that are necessary for VM studies. Data is required to make informed choices. If there is no ongoing cost management, then VM proposals selected may not be

incorporated into the design. VM on the other hand is beneficial to cost management because it lists ideas that could possibly save costs even if it is only at a later stage. The bottom line is that VM and cost management services should be integrated into a total project economics service to obtain optimal benefits from it.

2.2.4 Life cycle costing

Life cycle costing is a technique for economic evaluation which considers the costs applicable to the total life of the asset. The costs that are taken into account are the following:

- *Initial investment cost consisting of site costs, professional fees and capital cost
- *Energy costs
- *Operation and maintenance costs
- *Replacement of components costs
- *Occupancy costs
- *Alterations costs
- *Taxation costs
- *Salvage revenue and disposal costs

Life cycle costing goes hand on hand with a VM study and it is important to look at what it is and how it is incorporated into VM. "Forecasting and assessing the total cost of an asset over its whole life should be an integral part of any decision if the integrated team is to deliver the best value solution" (Thomas et.al 2005:179) In VM the life cycle costing is used as an evaluative tool. It can assess competing design alternatives, consider costs of ownership over the economic life of each alternative etc all expressed in present value. The method to bring all the costs to a comparable value is known as "discounting". The three most common methods are:

1. Net present value (NPV)

2. Internal rate of return (IRR)
3. Annual equivalent value (AEV)

It is very important to apply LCC techniques during the design as the design has a direct influence on operation and maintenance of a building. These costs are usually incurred over a long period of time and can collectively far outweigh the initial capital costs of the facility. Therefore, during a VM study the VM team must have detailed information about the economic life of the building/asset, operating costs, cost of the owners' capital required, return on investment figures etc to make informed and clever decisions, compare different cost alternatives and thus add value to a project.

2.2.5 Pareto's law of maldistribution

The Pareto principle is well known in the construction industry and it is important to take note of it. The Pareto principle otherwise known as the 80/20 principle basically states that a minority (20%) of the causes, inputs or efforts leads to a majority (80%) of the results. According to the CP de Leeuw internal working manual (1998:W16-1) this imbalance can be applied to many circumstances and is used in VM to determine the relatively small amount of elements or functions that comprises 80% of the project cost. The VM team can thus focus and divert more energy and give attention to the small number of causes, inputs or costs that will make up the majority of the overall project.

2.2.6 Factors to consider before initiating a VM study

- The potential for a value improved outcome that is perceived
- The stage of the project development cycle
- The need to have involvement and broad representation
- The benefits that will be obtained from involving the key stakeholders
- The availability of the stakeholders

- The costs of such a study
(www.build.qld.gov.au/sam_web/content/72.htm, access 22/05/2009)

2.3 When is the best time to implement VM on a project?

2.3.1 Who can initiate the VM study

Before one can look at when the best time is to implement VM, it is important to know who can initiate such a study. The following stakeholders will normally initiate VM:

- Client who would like to find the best solution, develop a clear brief of the project, reduce the risks and so forth
- The program director who seeks the involvement of the stakeholders in the planning process, wants time savings and are interested in a more comprehensive brief. The role that VM plays in project briefing will be discussed in a subsequent chapter
- The design consultant who wants the stakeholders to be involved with the design process to explore alternative solutions etc.
- The development manager which may be concerned with identifying solutions for delivery
- The asset manager who wants innovative strategies for managing the asset portfolio

(www.build.qld.gov.au/sam_web/content/72.htm, access 22/05/2009)

A survey was done by Kelly (2006:23) which outlines the main reasons why VM should be done. The survey was completed by the client, VM participants, facilitator and some other people. The main reasons as indicated by the survey were to arrive at a more effective design and to eliminate unnecessary costs.

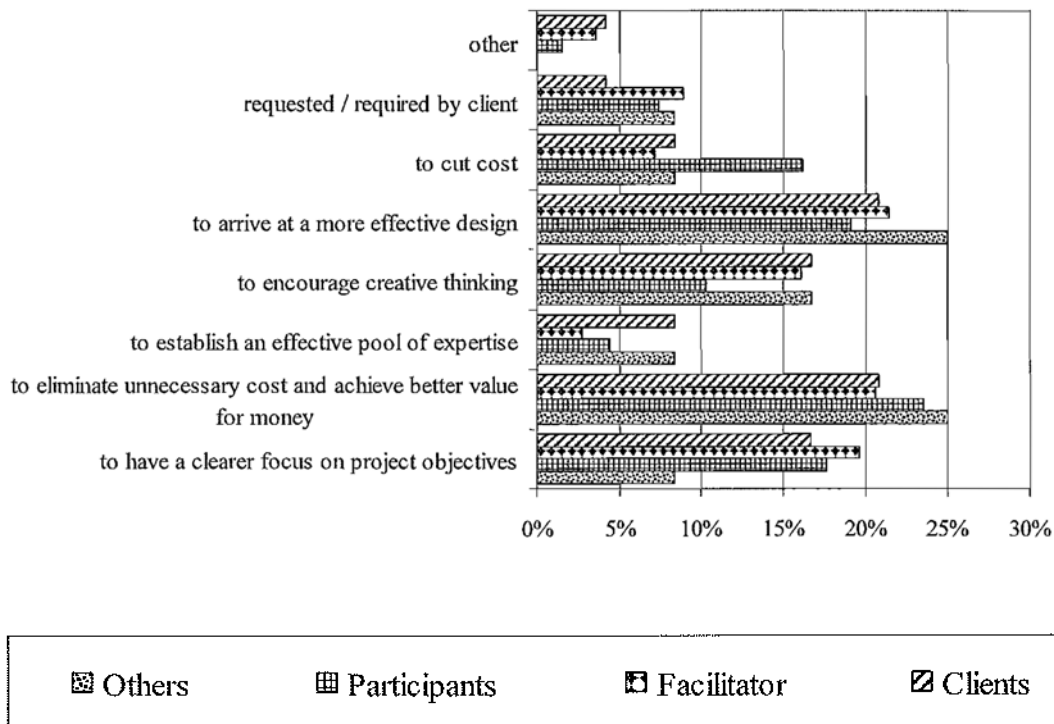


Figure 2. Main reasons for carrying out VM (Source: Kelly et. al. 2006:23)

2.3.2 At what project stages can VM be implemented?

VM can be done at any stage in a project lifecycle. The depth of study that is required from the VM workshop should be determined to suit the scope and size of the project. The following table identifies five project stages in which VM can be conducted. It lists the team members that should preferably be present, the tasks that should be done and the deliverables. It is safe to say that VM done in these stages identified hereunder will still benefit the client/project.

STUDY LEVEL	TEAM	TASKS	DELIVERABLES
1.Brief	<ul style="list-style-type: none"> ▪ Client ▪ VM co-ordinator ▪ Design Team ▪ Cost planner ▪ Specialist 	<ul style="list-style-type: none"> ▪ Determine needs and wants ▪ Set target ratios ▪ Set target costs ▪ Identify excess requirements ▪ Function analysis ▪ Generate/evaluate alternative options ▪ VM study 	<ul style="list-style-type: none"> ▪ Tested brief ▪ List of creative ideas ▪ Target ratios ▪ Target costs ▪ Implementation strategy ▪ Risk management
2.Concept design	<ul style="list-style-type: none"> ▪ Client ▪ VM co-ordinator ▪ Design team ▪ Cost planner ▪ Planner ▪ Specialist 	<ul style="list-style-type: none"> ▪ Compare efficiency ratios ▪ Compare target costs ▪ Identify excess requirements ▪ Function analysis ▪ Generate/evaluate alternative options ▪ Evaluate site opportunities ▪ Buildability reviews ▪ Programme alternatives ▪ VM strategy 	<ul style="list-style-type: none"> ▪ Evaluated alternatives ▪ Outline specification ▪ Optimum layouts ▪ Principal materials ▪ Approximate budgets ▪ Notional programme ▪ Implementation strategy
3.Scheme design	<ul style="list-style-type: none"> ▪ Client ▪ VM co-ordinator ▪ Design team ▪ Cost planner ▪ Contractor ▪ Planner ▪ Specialist 	<ul style="list-style-type: none"> ▪ Review efficiency ratios ▪ Review costs ▪ Function analysis ▪ Generate/evaluate alternative options ▪ Temporary works reviews ▪ Optimum statutory authority compliance ▪ Procurement strategy 	<ul style="list-style-type: none"> ▪ Tested scheme ▪ Design strategy ▪ Procurement strategy ▪ Cost plan ▪ Implementation strategy ▪ Programme ▪ Alternative opportunities ▪ Outline method

		<ul style="list-style-type: none"> ▪ Early TC involvement ▪ Life cycle costs 	<ul style="list-style-type: none"> statements ▪ Cost effective tender package
4.Elemental design	<ul style="list-style-type: none"> ▪ Client ▪ VM co-ordinator ▪ Design team ▪ Cost planner ▪ BCL project manager ▪ BCL package manager ▪ Trade contractor ▪ Specialist 	<ul style="list-style-type: none"> ▪ Function analysis ▪ Generate alternative options ▪ Appropriate selection of materials ▪ Avoidance of over specification ▪ Optimum performance related design info ▪ Ensure design flexibility for TC proposals ▪ Trade sequencing interfaces ▪ Mid bid reviews with TC's ▪ Life cycle costing 	<ul style="list-style-type: none"> ▪ Alternative opportunities ▪ Outline method statements ▪ Cost effective tender package ▪ Interface matrix ▪ Implementation strategy ▪ Change control
5.Procurement	<ul style="list-style-type: none"> ▪ Client ▪ VM co-ordinator ▪ Design team ▪ Contractor ▪ Programmer ▪ Specialist 	<ul style="list-style-type: none"> ▪ Generate alternative options ▪ Optimum performance related design info ▪ Trade sequencing interfaces ▪ Mid bid reviews with TC's 	<ul style="list-style-type: none"> ▪ Cost effective methods ▪ Optimum information level ▪ Optimum programme ▪ Optimum safety and quality ▪ Optimum document control ▪ Effective management and communication

Table 1. Value management study levels (source: Locke et. al:1994)

2.3.3 When is the best time to implement VM on a project?

The opportunity to improve value of a project is at its greatest at project inception, because as the project progresses construction costs and other costs and funds become committed. Objections to design or any other element should be made as soon as possible preferably during the briefing and design phase of a project. There are no to very low implementation costs for ideas given during the brief stage. As soon as construction starts and there has been detailed designs it become more expensive to change the building. Once the structure is erected, the options become very limited and costs of alterations are very expensive. Later intervention of VM tends to produce smaller proportional benefits, have a detrimental impact on the programme and meet greater resistance. Kelly et al (1993:64) suggests that VM be done at a point where approximately 35% of the design (schematic/sketch) is completed due to the fact that costing data will be more readily available in the form of estimates and savings can be more easily identified.

It is not uncommon to hold VM sessions at each stage of the construction development cycle on very large projects for the reason to ascertain that optimal cost savings are still obtained and that all other aspects like quality, time etc are on track. The figure below illustrates the different stages in a project life cycle and the potential cost saving to be achieved in the different stages. It illustrates the cost of making changes and it is evident that the further that a project has progressed the higher the cost of changes are.

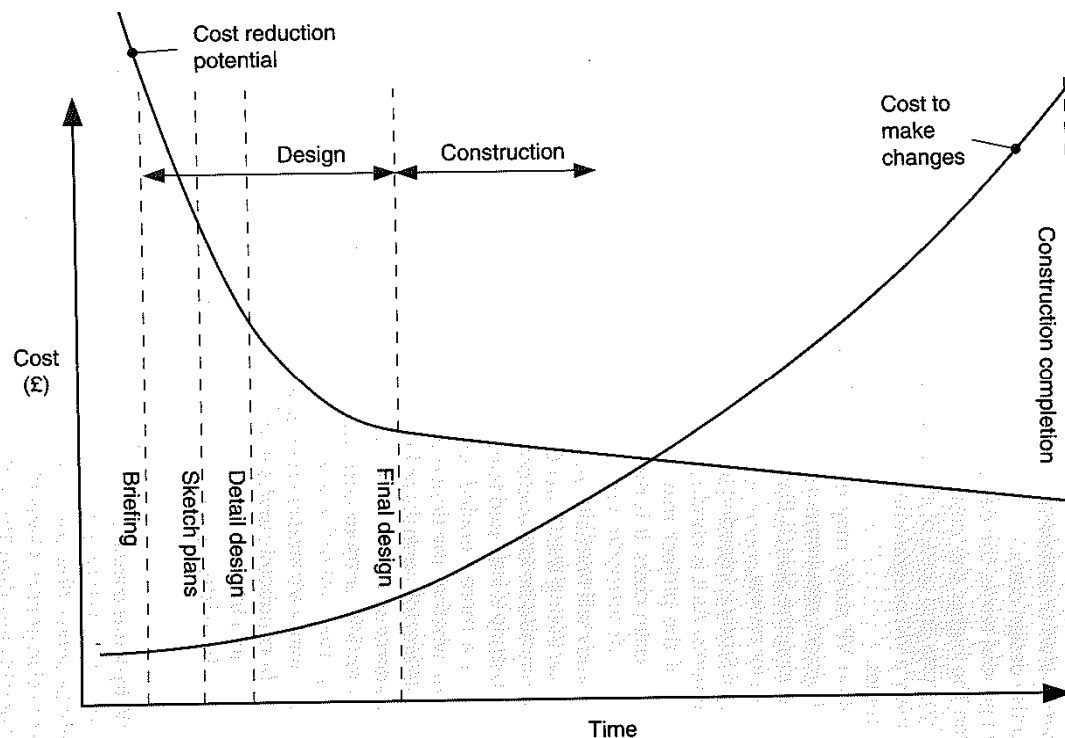


Figure 3. Cost reduction potential versus cost to implementation changes (source: Norton et. al, 1995:26)

2.4 Which types of project benefits the most from VM?

2.4.1 Which types of projects are most suitable for VM?

Norton et. al (1995:18) identified the following types of projects that will benefit the most from VM:

Costly projects

VM can result in savings of up to 5-15% of the total costs involved on the project and therefore it is very cost effective to apply VM to higher cost projects

Complex projects

With a VM study one has the opportunity to get expert second opinions, especially if there are members on the team that are independent from the original design team. On complex projects it is vital to get expert opinions. By using VM, attention can be given to complex issues

Repetitive projects

When the same type of building/asset needs to be build in many different locations, the utilisation of VM becomes very cost effective because cost reduction and ideas that add value to the project can be incorporated into all the buildings to be build later on

Unique projects with new technology elements and few precedents

The reason for using VM in the above type of projects is similar to complex projects. It relates to the obtaining of expert opinions

Projects with very restricted budgets

For these projects it is imperative to get maximum value for the least amount of money. VM seeks to eliminate unnecessary costs

Projects with compressed design programmes

VM should be properly coordinated with the construction programme to minimise time spent on it. VM can come up with innovative ideas to relieve pressure on design programmes and accelerate programmes

High visibility projects

These are projects sponsored by the government or environmentally sensitive projects. It is important that as little as possible goes wrong on these projects to avoid the media embarrassing the parties involved on the project

VM is not restricted to the types of projects mentioned above, but can be applied to any project/building or asset. VM can be applied to parts of buildings or subdivisions of projects. The general feel is that VM is more beneficial on larger projects due to the fact that there are certain costs associated with a VM study which will be discussed in more detail later. Visser (1998:82) wrote that it is feasible to apply VM to projects with a value of R 5 million and more. His

suggestion is based on interviews held with various clients and professionals in the industry.

2.4.2 Value management as a statutory requirement in other countries

The following information is given to illustrate the importance of VM in certain other developed countries and to give an idea as to the size (in monetary value) that a project should be to really benefit from VM. The Nieu South Wales Government in Australia issued a manual called “Capital works Investment: Value management Manual” (1990) as part of their total asset management. In this country VM is a statutory requirement and the following is stated:

- “Projects less than \$5 million: No formal requirements exist in terms of project submissions to the Committee. However, value management techniques should be applied, particularly in establishing the project rationale and considering options
- Projects of \$5 million and over: Formal value management sessions are required and submissions to the Committee require a summary of the value management study outcomes, copies of the value management study reports and the agency’s preferred direction and implementation strategy
- Designated projects: Due to the importance and or sensitivity of certain projects, the Committee may attach specific value management assessment and reporting requirements” (Visser, 1998:80)

2.5 Summary and conclusion

There are many definitions of VM, all of which describes VM as an effort to improve the value of a construction project and that it is not merely a cost cutting exercise. It is important to consider the life cycle costs of a project when doing VM. This chapter shows that it is better to implement VM early on in a project, but there are varying opinions as to when exactly the best time of implementation

should be. It is important to note that VM can be applied at any stage in the construction development cycle and is not only limited to the early phases of a construction project. Larger, more complex and more expensive projects will benefit more from VM than small once-off projects.

2.6 Testing of hypothesis

The hypothesis in chapter one stated that VM is a systematic multidisciplinary effort made to enhance the value of a construction project in many other ways than just cutting on costs and that the best time to implement VM is in the early development phases on a project and that optimal benefits will be obtained on larger and more complex projects.

It is clear from the foregoing information that the hypothesis as stated in chapter one is true in principal. With the above hypothesis kept in mind, one should not forget that VM is a flexible procedure that can be applied at any stage in the project lifecycle and to any project irrelevant of its, size, cost and complexity. It is not limited to the types of projects mentioned in this chapter but it is more beneficial to apply VM to those types of projects.

3.

WHAT ARE THE DIFFERENT STAGES INVOLVED IN A PROPER VM SESSION?

3.1 Introduction

This chapter will give the reader a short summary of the most common stages into which a VM session is divided into. There are a vast variety of techniques, each with its own phases into which it is divided that will be relatively similar in concept to the seven stages or phases that will be discussed in detail in this chapter. Kaufman, (1998:17) refers to these stages as the job plan and describes it as a disciplined approach consisting of sequenced steps that guide the VM team to solve the problems and challenges they are faced with.

One of the authentic characteristics of VM is that a specific identified and approved job plan should be followed as stated in chapter two. Rains (2008:29) illustrates this process including all the phases that is encountered in a typical VM workshop. He also gives a short breakdown of some of the activities that is involved with each of the phases.

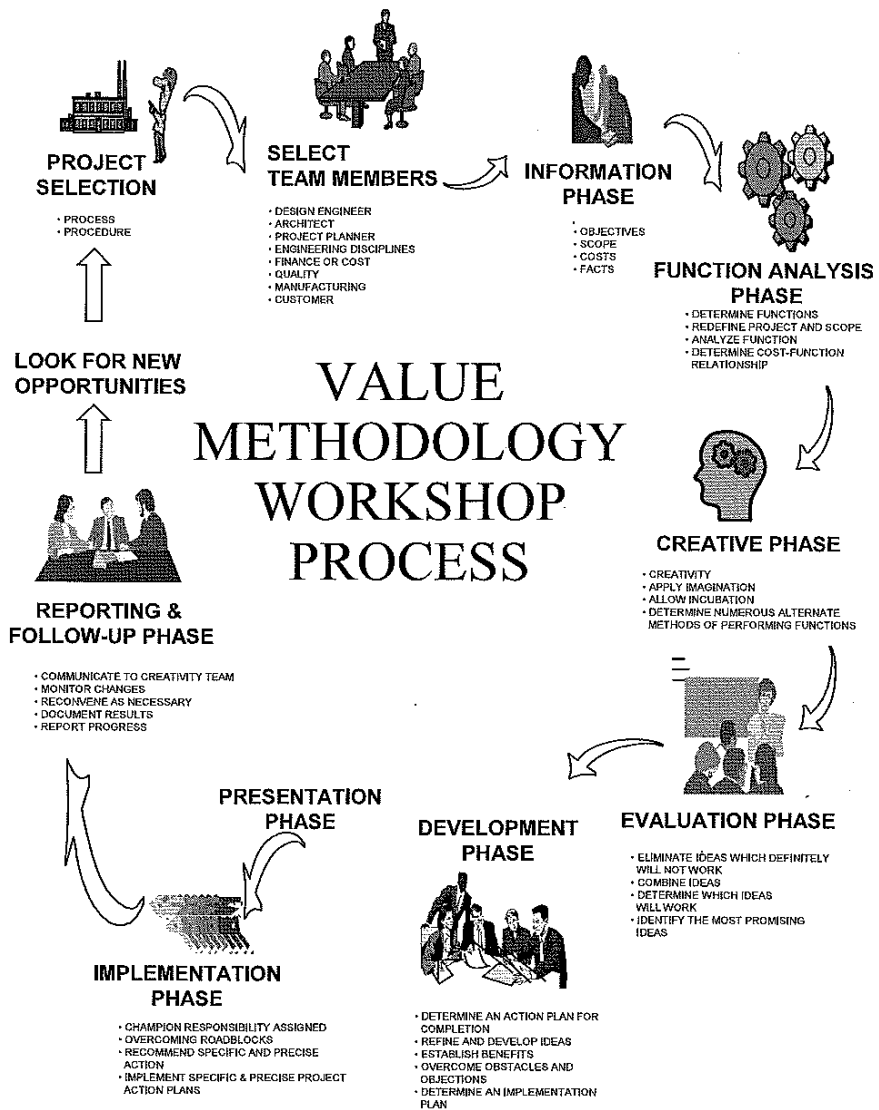


Figure 4. Value methodology workshop process (Source: Rains, (2008:29))

3.2 Seven phases of a proper VM session

3.2.1 Pre-study phase

The main objective of this phase is to ensure that the study to be done is properly targeted, that there is sufficient information to proceed with the study and that all

the parties involved are well coordinated. According to Norton et.al (1995:33) there are a few distinct activities that characterises this phase namely the following:

- Orientation meeting
- Finalising the team structure
- Selection of the team members
- Deciding on the duration of the study
- Determining study location and conditions
- Information gathering
- A visit to the site
- Cost estimate verification
- Preparation of models and efficiency data

Orientation meeting

It is advisable to have this meeting one or two weeks prior to the value management workshop. The persons who should be present at this meeting are the VM facilitator, the clients' representatives and the design team representatives. The purpose of this meeting is to establish a proper understanding of the project and the clients' objectives. This is very important so that information required for the study can be assessed and the logistics pertaining to the VM study can be arranged. In this orientation meeting the facilitator gets an opportunity to evaluate the constraints for the scope of the study. Other strategic matters are also briefly discussed like the team structure, duration of study etc.

Finalising the team structure

The correct team structure plays a cardinal role in VM and might be the critical factor which determines the success or the failure of a value management session. Optimally a team should consist of between six and twelve full time participants in order for productivity to be maintained. A team larger than that might become difficult to control and in some instances large teams tend to

inhibit some members of the team and hinder their full participation. There is a tendency that more confident team members dominate discussion whilst the timid members of the team shy away. The fear of public speaking which is inherent in most people may be a reason for lack of participation in a large group. For VM it is of utmost importance to obtain multi-disciplinary perspectives and therefore participation by all is important. Another reason why a smaller team is advantageous is because it is easier to motivate a smaller team and a good team spirit is one of the key ingredients of maintaining enthusiasm and thus productivity.

Selection of the team members

The team members should be carefully selected and the person responsible should consider persons beyond the design and construction disciplines. E.g. maintenance personnel, user representatives and client representatives. Maintenance personnel can provide input from their practical experience that is not perceived by designers, whilst user representatives may assist the team to understand the operations that are to be conducted by the project and the representatives of the client often have valuable background knowledge not available to the rest of the team members.

Deciding on the duration of the VM session

This decision is dependent upon the size, nature and complexity of the project. It is quite obvious that large projects that are more complex will require a longer VM session time. Another factor that should be taken into consideration is the stage of the project in which the study is to be conducted. VM is not always done at the beginning of a project as seen in chapter two. The traditional norm for VM studies has been five days. (Norton,1995:43) This is enough for most projects although the duration must still be tailored according to the circumstances. Most VM sessions are conducted in one continuous session but there are occasions where the sessions are split over a certain period of time. It may be more advantageous to take a break after the information phase in which additional

information may be sought and the function analysis which is discussed later is costed. Time to conduct a VM session should not be shortened below the minimum time needed because this will definitely limit and diminish the results of the VM session.

Determining study location and conditions

Although this may at first glance seem unimportant it actually has a relatively large impact on the success of VM. It is important to get the VM participants away from their normal workplaces for two main reasons namely:

1. If the study is conducted at their normal workplaces it is likely that the session will be interrupted as people attend to day-to-day tasks and commitments
2. Separating people from the workplace allows people to push aside their normal distractions and allows them to focus entirely on the task and project ahead

It is common practice to use an off-site meeting room or a conference facility at a hotel which is spacious and has adequate desk space for drawings, computers etc. The room should also have enough space to hang flip chart sheets which is often used during the functional analysis and creative phases of the study.

Information gathering

The quality of the resulting proposals depends on the quality and comprehensiveness of the information upon which the VM session is based. Information like project brief, drawings, specifications, programmes, estimates and design calculations should be supplemented by information on site conditions, project constraints etc. Good practice is to have an information gathering checklist. Most information will be sourced from the design team and the client depending on the stage of the construction project. A good knowledge management system should be in place. This subject will be discussed in more detail later on in this treatise.

A visit to the site

A site visit is important because it can help the VM team to visualise certain aspects of the project more easily and help them to better understand the project. Issues such as site access, topography, site density, presence of existing structures can all be clarified. If there are some members of the VM team that cannot attend the site visit they should be supplied with photos of the site.

Cost estimate verification

The cost estimates that are used in the VM should be as detailed and accurate as possible because of the fact that many decisions that are made in the VM session are based on cost considerations. Cost data are initially used to determine the areas of the project which represent poor value and later alternative proposals can be priced with that data. Norton, (1995:46) suggests that a dual estimate preparation and reconciliation be done to make the study more reliable. This is where the VM consultant and the design team prepares an estimate and these estimates are then reviewed for differences between them

Preparation of models and efficiency data

An effective way to assist the team to focus on and identify areas of poor value very quickly is by models prepared and efficiency data calculated prior to the study. Information is displayed in formats that can be readily understood by all the people whether the person forms part of the technical team or outsiders. A cost model is amongst the models commonly used and shows the allocation of all costs on the project. Other data are a spatial analysis and comparative efficiency data.

3.2.2 Information phase

The aim of this phase is to get all the members of the VM team to fully understand the aspects of the project and to broaden their perspectives beyond

their area of expertise. The College of Estate Management (1994:8) describes the function of this phase as follows: "A significant part of this first phase should therefore be spent on coming up with answers to the questions: 'what does it do?' and 'what else does it do?' This is of course more than merely defining and understanding the nature of the problem but concentrating people's efforts on producing as many answers as possible to these simple questions has been found useful in helping them to focus on the task in a more specific and efficient way." A FAST diagram is a tool used to answer and structure these questions above and will be discussed further. Kelly, (1993:12) gives the five categories of specific information as

1. Client needs
2. Client wants
3. Project constraints
4. Budgetary limits
5. Time available.

The information phase can broadly be categorised into two activities namely:

1. Presentations
2. Function analysis

1. Presentations

In this initial phase of the VM session the first activities are usually introductory. A person from senior management of the client will normally give a brief description of their goals for the study and state their commitment to the VM process, thus giving the VM team an immediate sense of purpose. The facilitator will then shortly give the agenda for the whole VM process.

After the description of the clients' objectives, descriptions of the design by the design team will follow, that being followed by presentations by the mechanical, structural and electrical engineer on their respective design elements. Where other specialist areas are important, brief presentations may also be given by

them. The presentations should describe current design and provide a reasoning and background including full details regarding major constraints and alternatives considered and rejected on the route to the current design. The process of verbal presentations eliminates misconceptions that might have existed between the various disciplines and to help the members on the VM team who have been less involved in the design to understand it better and participate as equivalent team members during the session. After the presentations there should be a quiet period for the reviewing of drawings and other documentation.

2. Function analysis

“Functional analysis is a key component of VM. It forces a broader and more comprehensive understanding of the project by stimulating intense discussion and by compelling team members to view aspects they might not normally have considered.” (Norton, 1995:58) FAST diagrams are basically another way of structuring this phase. A function of an item may be a characteristic that make that item work or one that makes it “sell”. For example VM recognizes that aesthetics can be a required function to be retained because unlike tradition cost reduction techniques VM must be undertaken without compromising the safety, quality, attractiveness and reliability of the structure.

The functions of a project are arranged in levels in hierarchical sequence. Kelly, (1993: 94-95) identifies the following levels in functional analysis:

- Level 1- Task. It represents the first stage wherein the client organization perceives a problem
- Level 2- Space. The stage where the architect or the whole design team are engaged in the preparation of the brief
- Level 3- Elements. Stage in which building assumes a structural form
- Level 4- Point where elements take an identity in terms of the built form

Functions are then classified as either basic or secondary which can be a difficult and subjective process. After establishing all the functions they are then costed to get a cost to worth ratio to identify areas of poor value.

The FAST diagram can also be used in the creative thinking phase and are especially beneficial to break a problem down into manageable portions and to identify the real problems rather than the symptoms. A disadvantage of FAST is that it takes a lot of time to do properly and time is usually constrained in a VM session.

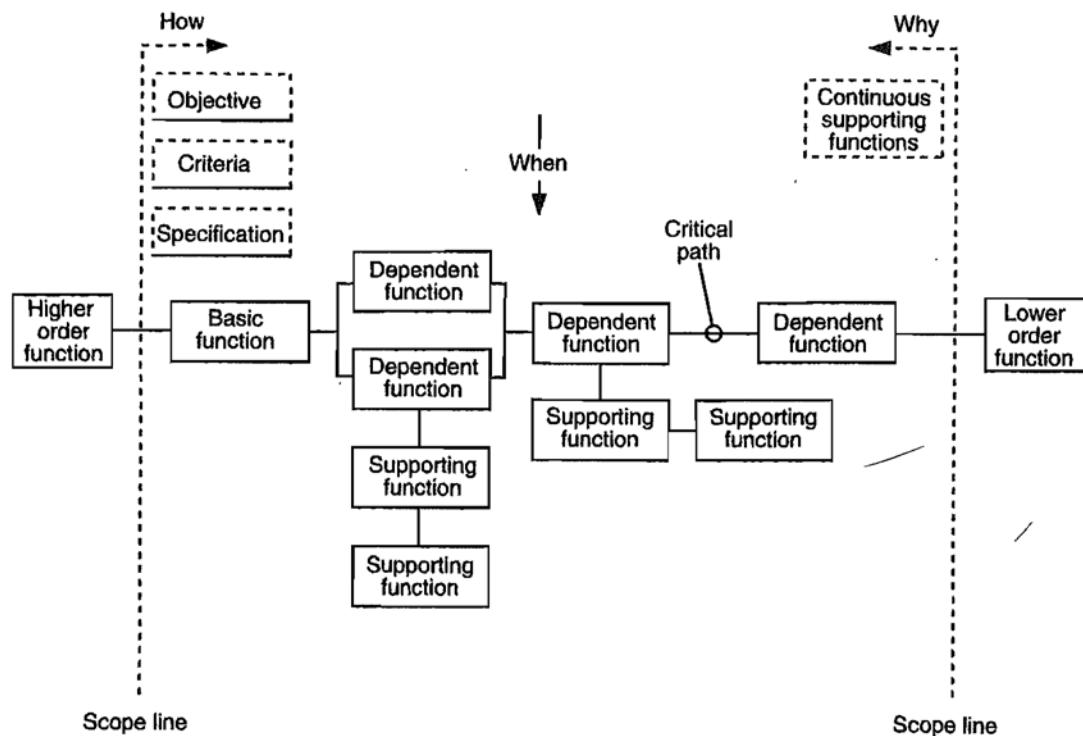


Figure 5. A typical fast diagram (Norton, 1995:73)

3.2.3 Creative phase

“The objective of this stage is to give all the team members the opportunity to put forward their suggestions for beneficial change without fear of recrimination or criticism.” (Thomas, 2005:148) This can be an enjoyable and fruitful experience where an abundance of ideas regarding alternative ways to achieve functions highlighted in the previous phase are gathered. The VM facilitator plays a cardinal role in stimulating the team to participate and positively contribute in this creative phase. There are a few basic principles of the creative phase that form the backbone of this phase. These principles are:

- ***Creative thinking techniques** like brainstorming where team members are pushed to innovative solutions
- ***Postponement of judgement** where judgement of the ideas that are put forward are not allowed, no matter how bizarre the idea seems
- ***Positive environment** is whereby people are convinced that their ideas will lead to positive improvements and negative thinking is eliminated
- ***Large quantity** of ideas is more important at this stage than the quality. Several hundred ideas in this stage is not unusual and the more ideas, the better
- * **Hitchhiking of ideas/ cross fertilisation** of ideas is where the different ideas are combined and the improvement of other ideas that seemed far fetched initially but forms a basis for another idea

Each person possesses creative potential and this potential can be improved with practice and training. In short the three mental processes associated with creativity are imagination, inspiration and illumination. Unfortunately there are some blocks to creativity namely:

- Perceptual blocks**: All people perceive things differently and sometimes a person blocks out information that is in conflict with his/her perceptions
- Habitual blocks**: This is where people follow procedures unquestionably just because they have done it that way in the past. Examples in the construction industry may be unchallenged standard specifications and briefs

-Emotional blocks: Many people are afraid of failing and making a mistake, and that may be the reason why they don't want to put an idea forward because they are scared it will be inferior or incorrect

-Cultural and environmental blocks: The way in which a person was raised may influence his perceptions about people and the world

-Professional blocks: Professional regulations and education tends to confine us within boundaries

One of the many advantages of this group brainstorming is that it provides synergy which basically means that the productivity of the group is higher than the sum of all the results of the members in the team. The success or failure of this phase rests in particular on the ability of the team leader/facilitator to create a conducive climate and so make it easier for the team to break away from more familiar modes of analytical thinking. (The College of Estate Management, 1994:8)

3.2.4 Evaluation phase

It is during this stage of the VM workshop that the team will jointly evaluate and prioritise the ideas that they think is worthwhile and can add value and where they dismiss those ideas that are not likely to add value to the project. The judgement that was suppressed during the creativity phase is now released. The ultimate objective of the VM session is to obtain proposals which can be implemented. The team members should be objective in the evaluation of the ideas and should consider the advantages as well as the disadvantages of each idea without discarding or accepting an idea too soon. Any criticism given should also be constructive and the VM facilitator should temper members who becomes criticising in an insulting manner.

Procedure

This stage normally takes twice as long as the creativity phase. There are many different procedures that can be followed and there are no hard and fast rules to the approach and method that should be followed during this stage. A generally accepted method is where the facilitator reads out each individual idea and invites the originator of the idea to explain his reasoning behind the idea. Then an evaluation technique is applied that eliminate impractical ideas and retain the ideas that could be beneficial for the project. After this 'weeding' of the ideas the remaining ideas are given to the team members for development. Before the evaluation technique can be applied there must be evaluation criteria set up.

Evaluation criteria

Like with the procedure that can be followed, evaluation criteria depend on each unique project and the circumstances. The typical technical criteria according to Norton (1995:99) that can be used but are not limited to are:

Cost: e.g. savings potential like initial capital cost savings, maintenance cost savings, staffing costs etc.

Function: e.g. Aesthetics, security, future expansion possibilities, safety during occupancy etc.

Time: e.g. impact on design time, construction programme and impact on the durability, reliability and service lives of components

General: e.g. the constructability of the idea, safety issues, political factors and jurisdictional matters to be considered

Evaluation techniques

There are numerous evaluation techniques available each with its own strengths and weaknesses. The three main techniques are:

1. Selection of ideas by the VM facilitator
2. Simple democratic selection
3. Complex democratic selection

1. Selection of ideas by the facilitator

Under the autocratic approach the facilitator selects ideas for development without obtaining input from the team members whilst under the autocratic approach the facilitator will make selections and ask for the opinion and approval by the team members

2. Simple democratic selection

The two broad categories identified here is consensus rating and voting techniques. There are several rating systems that can be applied, but this study will only look briefly at the rating system of Thomas, et.al. (2005:149) which suggests the following scoring system:

3- proposal that has potential to add value

2- proposal that has potential to add value but the team is unsure about it

1- proposal that has little merit for the project

0- for a wild idea

3. Complex democratic

In this technique the evaluation criteria is first weighed according to their importance and then alternatives are scored on the basis of this weighed criteria to determine the criteria that are most important.

It is often necessary to repeat this stage to reduce the number of ideas to be developed to a realistic level.

3.2.5 Development phase

The accepted ideas selected for further development are investigated and considered in detail for their technical feasibility and economic viability. Outline designs will be worked out and costs should be realised. (Kelly, et. al, 1993:14)
This phase can be a time consuming exercise and it is increasingly current

practice for this to be done outside the VM workshop. These proposed alternative designs must be supported by backup calculations, sketches and descriptions of cost and other implications. This is where the experts in the different disciplines come into play. The time allocated to this phase should not be shortened as this is a critical phase for the successful outcome of the VM workshop.

Comprehensive proposals are formulated in this phase which provides and extension to the evaluation process. Descriptions of the proposals should be detailed and supported by backup data so that they may be understood correctly by all the decision makers and because these proposals are often reviewed by different types of audiences.

According to Norton, (1995:111) the typical contents of a proposal are the following:

- Description of the original design
- Description of the proposed alternative design
- Advantages of the proposal
- Disadvantages of the proposal
- Discussion
- Life cycle cost implications
- Supporting technical backup

3.2.6 Presentation phase

The objective of this final phase is to assist the communication of the results of the VM study to the decision makers and the original design team. The refined ideas supported by drawings, calculations and costs are presented by the team to the body that commissioned the VM workshop. The audience of these presentations are usually divided into two groups namely the original design team that will be predominantly interested in the technical aspects of all the proposals and then the less technical persons on the team like the management

decision makers etc. The presentations must be able to cater for both these groups. The presentations should communicate an understanding of the proposals and not so much to decide on their acceptability.

It is useful to establish a friendly atmosphere when giving the presentations. Presentation skills are important to convey the information properly and keep all involved and listening interested in the presentation. The team member doing the presentation should be well prepared, thus giving him confidence. It is normally a good idea to make use of visual aids, like models, graphs etc. The team members' body language also plays a vital role when he is trying to convey his message.

3.2.7 Post-Study phase

Completion of the physical VM workshop does not mean that the VM process as a whole has come to a conclusion. There are a number of post-study activities that needs to be carried out in order to reap the fruits and maximum benefits of the VM study. The primary objective and focus of these post-study activities is to ensure that the feasible and advantages proposals that can add value are actually implemented. If there is a poor implementation rate VM can be considered a failure and a process which basically just wasted everybody's valuable time. Another function of this phase is to provide the opportunity to identify and collate lessons learned in the VM process and to help improve future VM studies.

This post study phase can be divided into the following three phases:

1. Report preparation and review phase
2. Implementation phase
3. Follow up phase

Immediately after the VM study a written report should be prepared stating the study findings. This will be the preliminary report including information like an executive summary, summary of the proposals, individual proposals and suggestions, list of all present at VM sessions etc. A final VM report must also be compiled giving the disposition of the proposals and lessons learned during the workshop. In the implementation phase a plan must be devised by the client's project manager or another representative to overcome the hindrances to the effective implementation of proposals that can benefit the project. Closure should be obtained in this phase regarding all the proposals still left open after the implementation phase and ways of improving the VM workshop should be discussed together with the lessons learned.

3.3 Summary and conclusion

In short the seven phases in a VM workshop are the following:

1. Pre-study phase
2. Information stage
3. Creative phase
4. Evaluation phase
5. Development phase
6. Presentation phase
7. Post-study phase

Not all of these phases are employed in the detail as discussed in this chapter and there are many variances to these phases. It depends on the time available for conducting the VM session and the size and complexity of the project.

3.4 Testing of the hypothesis

As stated in the introductory chapter the hypothetical answer was “The general most commonly used stages and phases into which VM is divided are the following:

- Pre-study phase
- Information stage
- Creative phase
- Evaluation phase
- Development phase
- Presentation phase
- Post-study phase”

This is partly true. The above mentioned phases are the most common phases into which VM is broken up, but it certainly is not limited to the above phases only. The phases employed will depend on the type of VM workshop conducted, the time available and the unique circumstances of each project. It will therefore differ from each other. VM is also a process which is not 100% rigid, but affords some flexibility depending on the circumstances to which it is applied.

4.

WHAT IS THE ROLE OF THE VM FACILITATOR AND WHICH PERSON IS BEST SUITED FOR THIS TASK?

4.1 Introduction

For value management to be successful there are certain prerequisites that need to be in place. One of those prerequisites is an experienced VM facilitator. The facilitator is a key element of a VM workshop and is critical to the success of the VM process. Whether the VM facilitator is an internal or external person to the professional team he or she should be knowledgeable about VM techniques and how to effectively apply them. The facilitator needs a skills base and in-depth knowledge of function analysis, group and team building. (McGeorge, Palmer, London, 1998:29) This chapter will evaluate the roles and responsibilities of the VM facilitator, take a look at the skills such a person should ideally possess and whether to appoint a person within the organisations involved or to employ an outsider to facilitate the workshops. The role of the quantity surveyor as a potential VM facilitator is also considered.

4.2 Roles and responsibilities of the VM facilitator

It is essential that a VM facilitator be appointed to conduct, guide and lead the proceedings in a VM workshop. The facilitator has very specific roles and responsibilities to fulfil. Norton, (1995:91) identifies six main roles of the VM facilitator. These are the following:

4.2.1 Guidance in creative thinking techniques

The facilitator is responsible to select appropriate creative thinking techniques and guide the team members when these techniques are applied. This requires the facilitator to be knowledgeable of all the different techniques available and which would work best in certain situations. It might be necessary for the facilitator to get the ball rolling by proposing a few wild ideas himself/herself or to draw out ideas from the team. The facilitator should also bring the team back to focus when they tend to drift away from the real problem to be solved.

4.2.2 Structuring the process

The VM process should be structured and depending on the stage at which VM is applied in a construction project, it might be structured to initially consider overall project concepts and then later move on to more detailed areas. Clear separation between the different stages of the workshop is necessary. The facilitator should not use too much control to destroy the flow, nor should he/she have too little control over the team.

4.2.3 Recognition of valuable ideas

The facilitator should attain a level of intuitive appreciation of ideas which has potential. He/she should guide the team to develop such idea so that it can become useful to the project. The facilitator must act as an catalyst, should encourage and challenge the team's thinking.

4.2.4 Deferring judgment

It is very important especially in the creative phase that no person in the team will judge other persons' ideas or comments. The VM facilitator should gently but firmly stop such negative remarks because the session can easily degenerate

and become disorganised and produce poor results. Some members on the team may also feel afraid to share their ideas if such ideas it is criticised right away.

4.2.5 Creating a conducive environment

The facilitator plays a key role in establishing a positive atmosphere during the workshop. The facilitator is advised to use an element of fun which helps members to relax, stimulate creativity and increases team spirit. Members should be orientated to look for reasons why an idea can work and how such idea can be modified to be beneficial for the project.

4.2.6 Recording

It is very important to record all the ideas shared in the VM sessions. The facilitator is responsible for recording all relevant information, comments, ideas etc. In some instances he/she will make use of an assistant to write down the ideas etc generated. Other methods of recording can also be employed and the facilitator must manage such methods. According to CP de Leeuw there normally is a person responsible at the VM session to capture all the ideas and it is then immediately displayed on a large screen so that the person who gave the idea can see if his/her idea was interpreted correctly.

There are many more roles and responsibilities of the facilitator besides the abovementioned roles. Other roles might be the following:

- ◆ Building the integrated team
- ◆ Helping the team to come to decisions
- ◆ To align the efforts of the team so that common objectives can be achieved
- ◆ To maintain the momentum of the sessions and delivering objectives and goals on time

- ◆ Being able to adapt the facilitation style to suit the team dynamic
- ◆ To value and encourage the contributions from all the members
- ◆ To develop a specific project culture and overcoming the cultures of all organisations involved
- ◆ Dealing with the hidden agenda of members like ambitions, organisational politics, prejudices or professional rivalries
- ◆ The facilitator should recognise the individuals so that that individuals' expertise is not lost
- ◆ The facilitator should question and summarise the results of the VM workshop
- ◆ A sense of motive, direction and common purpose should be established by the facilitator

(Kelly et.al 1993:157) (Thomas, et.al 2005:13)

It is important to understand that the role of the facilitator is not to provide technical advice, to offer solutions or to make decisions on behalf of the team. The emphasis of the facilitator's job is to enable and guide rather than to play a central part in the discussions.

4.3 Skills required by the VM facilitator

The VM facilitator should possess certain unique competencies and skills in order to carry out his/her responsibilities effectively. It takes a lot of skill and tact to orchestrate stakeholders and professionals with often widely divergent backgrounds, interests and objectives. Little or no software exist that can take the place of a facilitator. Even electronic value management (a term that will be introduced later in this treatise) makes use of an identified and experienced facilitator. There is a close relationship between the roles that the facilitator needs to fulfil and the skills he/she needs to have.

Here follows a list of skills, competencies and character traits which the facilitator should preferably possess:

- Excellent communication skills
- Must be a good listener
- Strong leadership abilities and authority
- Facilitator have good public speaking abilities
- Should have moderate to good computer literacy
- Should be able to do presentations using visual, audiovisual etc tools
- Be able to control a team and influence them
- An extrovert personality is advised but not essential
- Organisation and good management abilities
- Facilitator must be able to motivate project participants
- He/ she should be able to analyse complex problems
- The ability to tease out issues from a project background
- Innovative ideas and solutions
- Should be able to adapt to different and new circumstances fairly easy
- The facilitator must be able to resolve conflict and play the role of mediator/arbitrator when a conflict situation arises
- Should have knowledge of the project and the field of the project e.g. for a construction project he/she it is advantageous if the person is working or has worked in the built industry
- It is of vital importance that the facilitator be objective
- Understanding of group dynamic

(May, 1994:24-26) (McGeorge, 1998:29) (www.alabc.org.uk, access date 9/02/2009)

It is often quite difficult to choose the correct and competent facilitator for a particular project. It will be very seldom that you get a single person that possesses all of the abovementioned qualities and character traits.

4.4 Appointment of an internal vs. external facilitator

Much debate is taking place about whether it is better to appoint an in-house or an external VM facilitator. There are advantages and disadvantages of both these approaches which should be carefully considered. Before making a decision on who the facilitator must be, the following factors should be considered:

1. Experience as a VM facilitator
2. Experience with similar projects
3. Willingness to comply to VM rules and regulations (Applicable in New Zealand and not yet so much in South Africa)
4. Qualifications
5. Cost/fee of the facilitator
6. Availability of the facilitator

(Devonport, et.al 2007:5)

The advantages and disadvantages regarding the use of internal or external facilitators are summarised in a tabulated form below:

	Internal facilitator	External facilitator
Advantages	<ul style="list-style-type: none"> • Facilitator is familiar with the project and can therefore help team to better understand the project • More effective team building is possible • Not as expensive as external facilitation 	<ul style="list-style-type: none"> • New original and fresh ideas can be generated • Design can be critically appraised without having to defend existing ideas • Can carry over experience from previous projects and organisations • Objectivity

		<ul style="list-style-type: none"> • Less likely to be influenced by political considerations • More freedom and boldness to challenge the status quo • There exist the ability of the core group to hire a specific skill at a specific time • Not affected by peak workload periods in the organisations involved on the project
Disadvantages	<ul style="list-style-type: none"> • The facilitator may find it difficult to appraise own work critically • Lack of fresh and new ideas • More likely to conform to original approach and take it as the most effective one • Lack of objectivity and bias 	<ul style="list-style-type: none"> • Conflict may exist between internal and external parties • Ownership and liability for design ideas may be unclear • Project team may not be willing to implement ideas of external persons/facilitator • Usually more expensive than an in-house facilitator • An external facilitator can cause more disruption than a facilitator with whom most is familiar

Table 2. Internal vs. external facilitation (Source: Thomas, et.al 2005:14 & www.constructionexcellence.org.uk, access 22/05/2009)

Judging by the summary of advantages and disadvantages above it is quite clear that to appoint an external facilitator would be better and more beneficial to the project as a whole. Careful judgment should be used when deciding between these two types of facilitators because some projects may need the facilitation to be done in-house and some projects may require some expertise and objectivity from outside as obtained from utilising outside facilitators. The complexity of the task and nature of the project should be considered.

One of the main disadvantages of an external facilitator is the costs associated with his services. Norton, (1995:162) doesn't seem to think that this is a problem stating the following " Since the results of a VM study results in significant project cost savings which far outweigh the costs of the study, it may not be prudent to base external consultant selections heavily on fee considerations"

4.5 Training of facilitators

The facilitators' role is not a straightforward role requiring tangible elements like guidance of the VM process and intangible elements like managing the dynamic team environment. The importance of a well trained facilitator should not be underestimated because it can have a direct influence on the results of a VM workshop.

In various other countries like Australia, a person can become qualified as a "Value management facilitator". The Institute of Value management in Australia has certain criteria on which potential facilitators are evaluated and they should be in possession of a qualification equivalent to the 'practitioner grade' of the Institute. The UK also has an Institute of Value Management which does the certification of VM facilitators. Qualified facilitators hold the qualification "Professional in value management" (PVM)

South Africa does not have official training for VM facilitators yet and a process of mentorship is suggested especially for the more intangible elements mentioned above. Trainee facilitators should attend VM workshops under the guidance and mentorship of experienced VM facilitators. The trainee may have been a team member at first who later progresses to the role of assistant facilitator. When the trainee has gained the appropriate experience the mentor's role may be dispersed with.

4.6 The role of the quantity surveyor in VM

Prof. dr. Roelf Visser conducted a study on the potential role of the quantity surveyor in value management in the construction industry. Included in his research is an evaluation of the ten most important competencies and skills the VM facilitator should possess and how quantity surveyors scored in each of these 10 most important competencies. The results were obtained from 412 registered quantity surveyors who were invited to participate in this survey by filling in questionnaires. Listed hereunder is a summary of the results of the survey as done by Visser in his thesis: (1998:132)

Skill required	How the QS's scored
Creativity	Poor to below average
Mental clarity	Below average to average
Leadership	Poor to below average
Ability to listen	Average to above average
Handling conflict	Style: working together
Expression style (social)	Supportive style
Innovation	Average to above average
Adaptability	Poor to below average
(Self) Motivation	Below average to average
Abstract arguing	Average to above average

Table 3. Summary of skills and competencies of a typical quantity surveyor (source: Visser, 1998:132)

According to Visser, the results were based on averages and there were individual quantity surveyors who obtained favourable scores and who would be able to perform well as facilitators. Based on the above results it can be deduced that the average traditional quantity surveyor is not well suited to offer a service

as a VM facilitator. This does not mean that no quantity surveyor will be a good facilitator, in fact due to some quantity surveyors' background and experience they are very good potential candidates to facilitate VM workshops. Visser, (1998:133) also states that the opportunity exists for the quantity surveyor to master the techniques and obtain the desired skills of VM to enable him/her to render a more comprehensive service to the client that will add value.

4.7 Summary and conclusion

It became evident that the VM facilitator has certain core roles to fulfil and in order to do that he/she needs to possess certain skills and competencies. Value management will only be successful if the facilitator applies both rational problem-solving skills and the 'softer' inter-personal skills associated with people management. According to a study conducted by Visser, (1998:132) quantity surveyors on average do not possess all the necessary skills to become competent VM facilitators. It was also found that it is in general more beneficial to the project as a whole to appoint an external facilitator but one should first carefully consider the nature, complexity and requirements of the project. There is no official VM facilitation training in SA yet and a programme of mentorship therefore is mostly employed.

4.8 Testing of hypothesis

As stated in the introductory chapter the hypothetical answer was: "The facilitator must orchestrate the professionals and team members all with their divergent backgrounds, interests and objectives. The facilitator must guide and enable the proceedings rather than dictate the process and the participants' way of thinking. An outsider to the project, but still a built environment professional would be the best facilitator because he/she will be the most objective"

This was found to be true, although no specific mention was made that the external facilitator needed to be a built environment professional, but it was stated that he/she should be familiar with the type of project and have experience on similar projects.

5.

HOW IS VM AN INTEGRATED PRACTICE & SHOULD VM FORM PART OF THE CURRICULUM OF COURSES RELATING TO THE BUILT INDUSTRY?

5.1 Introduction

VM is a practice comprised of many different managerial, technical and other elements and practises combined. VM is undoubtedly a tool in management of projects. VM also provides the framework to guide and encourage other practices (e.g. risk management, sustainability issues, life-cycle costing, lean construction etc). The second part of this chapter investigates the importance of educating people about value management and suggests that it starts at a tertiary level for all involved in courses relating to the built environment industry. Typical learning outcomes for a subject in VM will be looked at, as well as the themes which should be dealt with in such a course.

5.2 VM, an integrated practice

VM is not an alone standing practise. It is inevitable that when practising VM you will be incorporating other important practises that should also be considered in construction projects, for example risk management, life cycle costing etc. It is important to see VM as an integrated practice because you can't employ VM without proper knowledge of other practises needed to ensure successful planning and construction. You also need to have knowledge of VM to effectively use these other tools and strategies to ensure project success. Only ten

examples of how VM is an integrated practise will be discussed very briefly. It is definitely not limited to these few examples, but for purposes of the treatise this chapter only intends to make the reader aware of the fact that VM is an integrated practise. This topic extends far and wide and will not be dealt with in much detail. Here follows some examples:

5.2.1 Life cycle costing

Life cycle costing was already dealt with in chapter two, and will only be briefly mentioned here. In order for a team to make a decision that offers the best value solution it must forecast and assess the total costs of an asset over its whole life. This in short is what life cycle costing entails. It is an analytical technique to do comparative evaluations of time-phased costs and revenues over a specific identified period of time. In a VM session, life cycle costs must definitely be brought to the table so that informed decisions can be made.

(Thomas et.al, 2005:179)

5.2.2 Risk management

Risk management includes all the activities required to firstly identify and then control the risks associated with the project. Risk management and VM are continuous processes throughout the procurement life cycle to help the team make the best decisions at the right time. The best ideas to improve value can sometimes be the most risky and that is the reason why risk should always be considered within a VM study. It can be done in the following ways:

- When evaluating ideas generated in the workshop
- As a separate phase in the VM workshop
- Doing a full risk workshop
- Including risks in the decision matrix for the selection of options in VM

“The VM process is itself a risk management process by developing a mutual understanding between the stakeholders, developing project learning earlier in the process, challenging assumptions, generating alternatives and promoting

synergy between the whole team.” (www.alabc.uk/nov_02/HH%20Handout.pdf, access 13/03/2009) Ellis, Wood, Keel (2005:509) evaluates the suggestion that consultants develop new approaches that seek to integrate both concepts into one workshop. This pro-integration view was not unanimous due to the logistical difficulties and some other barriers. It is very clear from what is being said on risk management that it very much forms part of the VM process.

5.2.3 Lean construction

Lean construction is a way to design production systems to minimise waste of materials, time and effort in order generate the maximum possible amount of value (http://en.wikipedia.org/wiki/Lean_Construction, access date 6/05/2009) As with VM the lean construction practice aims to reduce the unnecessary costs from the construction projects and this is done within the context of whole life costing as mentioned above. The figure below is an illustration of lean construction and what it entails.

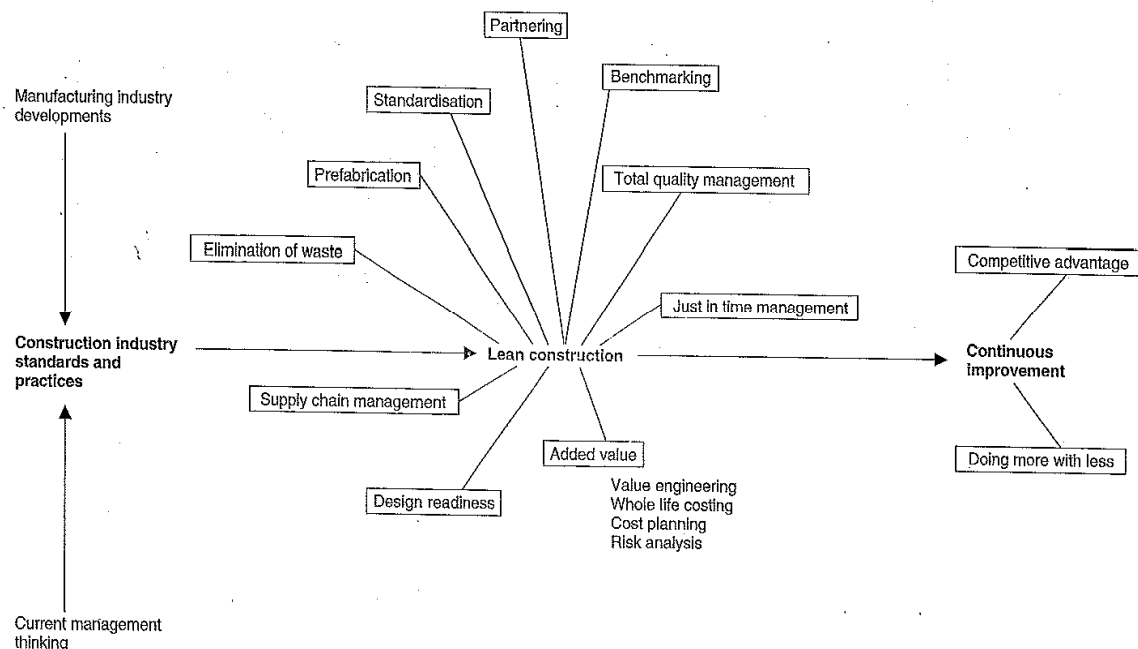


Figure 6. Lean construction (source: Ashworth, 2006:210)

5.2.4 Total asset management

The definition of total asset management (TAM) is that it is a practice that reflects priorities for services planning, whole life asset management, extended planning requirements for new works and new relationships between services planning and asset procurement activities. Value management should be done at each step of TAM to ensure that the best value is obtained.

(www.treasury.nsw.gov.au/, access 14/08/2009)

5.2.5 Project management

Project management is a practise that is involved with the overall planning and coordination of a project from inception to completion aimed at meeting the client's requirements and ensuring completion on time, within the cost limits and to the required quality complying with relevant standards. (Chartered Institute of Building, 1982). Value management tools form part of the early strategic project management inputs in developing the project brief and design concept. Briefing is the first and most important step in the design process. VM has led to major improvements in the process. A methodology which utilises VM has been developed which systematically identify and clarify client's requirements in the briefing process.

(Hunter, Kelly, Shen, Yu, 2006:20)

5.2.6 Management styles

It has been argued that function analysis is the only distinguishing characteristic in which VM differs form other management philosophies and approaches. Many of the tools and techniques used in the facilitation of the workshops are not unique to VM but it is comprised of many management methodologies structured together. VM as a management style focuses on value system evolution and resolution within a project by bringing together the right team of stakeholders at the right time.

(Graham, Gronqvist, Kelly, Male, 2006:1)

5.2.7 Knowledge management

Knowledge management is a process to create, secure, capture, coordinate, combine, retrieve and distribute knowledge. (AbouRizk, Mao, Zhang, 2009:778) Knowledge will not bring value unless it is actively and properly applied and when quality knowledge is obtained. One of the risks and barriers of VM is that the quality of information is poor and that influences the decisions that are made negatively. Innovative problem solving tools can be built in the knowledge management system to enhance the efficiency of the VM study. Redundant work is reduced in future VM studies because records are kept of previous acquired knowledge. The figure below will show how knowledge management and VM will be integrated.

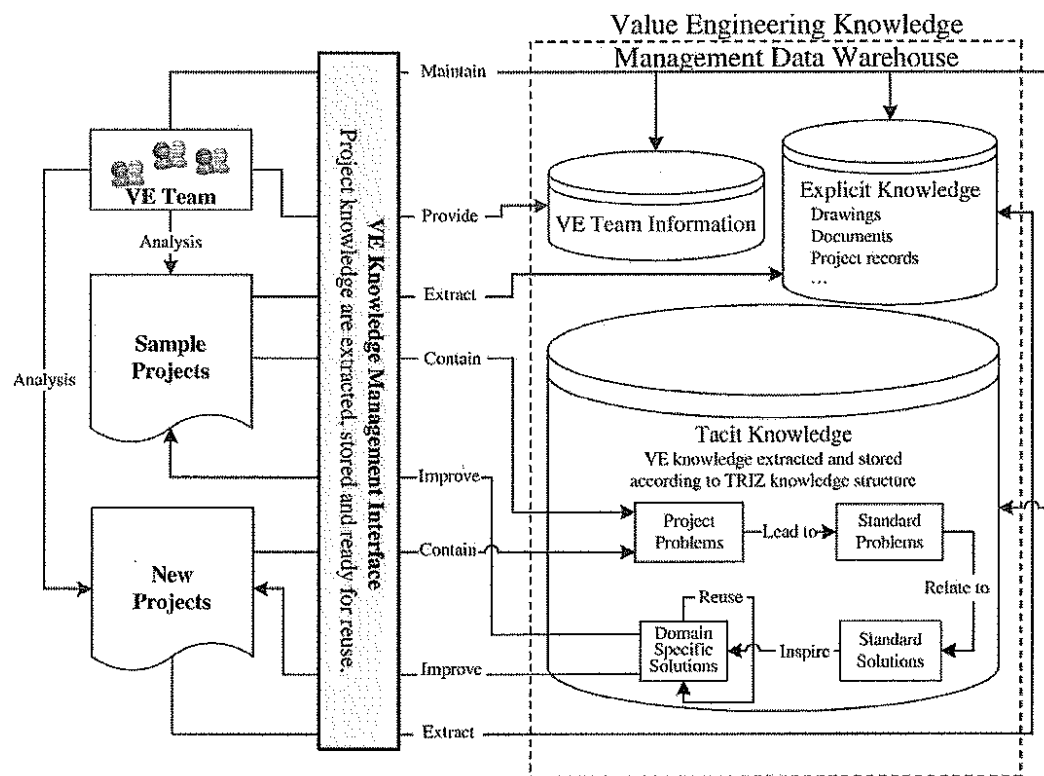


Figure 7. VM knowledge management system (source: AbouRizk et. al. 2009:780)

5.2.8 Sustainability

According to Abidin, Pasquire (2007:277), there are three main ways in which society can be sustained and that is through environmental sustainability,

economic sustainability and social sustainability. VM offers the opportunity to include sustainability issues early in the project where its impact would be the greatest. The concept of integrating sustainability with VM refers to the combination of sustainability aspects into VM practises to enable those issues to be considered and integrated throughout the whole process and decision making in VM.

5.2.9 Best value tendering

A VM based method can be used to discover the project value criteria which will become the measurement principles against which a consultant or contractor can be chosen. A complete VM workshop is not fundamental to ensure best value tendering, but the preparation of the pre-tender documentation through a brief VM session and using a panel of members of the workshop to judge the tenders will increase the certainty that judgements are fair.

5.2.10 Cost management

There is a definite difference between cost management and VM as explained in detail in chapter two. It is essential to understand that both VM and cost management is necessary to ensure project success and it should be combined to obtain optimal value for money. VM without cost management will not be very effective and cost management needs VM to ensure that decisions regarding costs are generated and implemented.

5.3 VM being taught at educational institutions

As stated in chapter one, questionnaires were handed to selected persons to complete and various formal and informal interviews were conducted with professionals in the built environment industry. One of the questions asked in the interviews and posed in the questionnaire was whether that person thought VM should be taught at educational institutions in the built industry. The overall opinion was that it should definitely be introduced as part of the curriculum for

students studying a course related to the built environment industry due to the fact that it is mostly a value-adding activity. All but one of the respondents to the questionnaires agreed that VM must be introduced to students. The persons interviewed who had more comprehensive knowledge of VM, generally felt that it must be a service which should be delivered to the client and to involve most of the professionals more actively in the development of a project. Some other professionals thought that it will create an early awareness of life cycle costing and that it will help persons in the industry to better predict problems early in the project.

The results of the questionnaire further revealed that some professionals in the built environment industry have never heard of VM, or were only vaguely aware of VM and very few respondents have participated in a VM session. Due to the fact that VM is not well known or practised often in the built environment industry in S.A., students should be familiarised with VM even if only a theoretical background is obtained. VM was at one time part of the MSc Quantity Surveying degree at the University of Pretoria, but has since been removed from the curriculum and replaced by other subjects.

This same dilemma as above is experienced in Hong Kong and they strongly believe that the answer is that VM should be introduced at a tertiary level of education. Many of articles were written on 'teaching VM in study courses'. The following paragraph briefly states the 'Hong Kong experience' with VM according to Fong and Shen. (2000)

Fong and Shen (2000:322) make the following statement "Facing the conservative attitudes of the clients and the construction professionals, it is very difficult for new concepts to be developed and disseminated widely. Thus it is necessary for professional institutions and universities to educate people in the construction industry so that they will not reject this new concept out of fear and will come to appreciate the true value of VM". In other words, it is basically to

make people aware of the concept of VM, increase their knowledge of VM and afford them some practical experience in VM.

The typical learning outcomes for a VM subject will be:

1. The student must have an understanding of the methodology followed with VM
2. He/she must be able to manage and organise VM workshops in the different phases of a project life cycle
3. He/she must have thorough knowledge and be able to conduct functional analysis and life-cycle costing on a project
4. Students must exercise practical creativity skills to work with a team of stakeholders to arrive at solutions that are innovative and can be used
5. Students must ensure value for money will be achieved on a project by applying VM tools in a business or technical situation

The syllabus content of a VM course or VM subject should include the following:

- The meaning of value, function and cost
- VM basics, e.g. history, project selection, alternative workshop approaches
- VM methodology: the job plan, group dynamics, facilitation, creativity and problem solving skills
- Timing of the study, managing the workshop, success factors for VM
- Life cycle costing of projects
- VM comparison with traditional cost cutting methods
- Benefits and limitations of VM
- Case studies and practical examples

(Yu, Shen, 2008:6)

Lueng (2006:20) believes the aim of the course in VM is for the students to be able to identify the function of the design or product, to allocate cost and worth to function, apply creative techniques in developing alternatives, prepare cost models, perform as a member of the VM team and to understand the whole VM

workshop and what it entails. Due to the fact that VM is so practical, it is of no use to only focus on the theoretical side of VM, but the students must gain practical experience of VM. At the McGill University VM workshops are provided where the students have the opportunity to solve the common value problems of a real-life project selected by a company.

The students benefit tremendously from such workshops by learning the VM methodology, developing analytical and investigative skills, obtaining experience of real world problems, seeing how business and technical operations of a company work. Statistics at the University has shown that about 50% of ideas generated by the students and recommendations made were implemented. The companies therefore also benefit from this experience.

(Thomson, 2008:14)

5.4 Summary and conclusion

It is very clear that VM is integrated into a lot of other important practises that is vital for project success. Professionals should familiarise themselves with these other strategies in order to perform better VM and provide a service of a high standard to the client.

The driving force for VM in Hong Kong is the Hong Kong Institute of VM and the Universities that have started to provide VM courses. South Africa also urgently needs such driving forces to take VM forward in the country. A good start will be to begin with the education of students studying a course in the built environment. There are some suggested learning outcomes and syllabus contents which cover the basic aspects of VM. There are many advantages when educating people in the built environment industry early on about value management.

5.5 Testing of the hypothesis

This is the hypothesis as stated in the first introductory chapter: “VM is not an ‘alone-standing’ practice and a lot of other management and construction partnering techniques and collaborative working are incorporated into VM. Students should be introduced to VM during their time of studying a course related to the built environment industry to make VM more successful”

The first part of this hypothesis proves to be true. Many other strategies, concepts, tools and practises are incorporated into VM as shown in the first part of this chapter. Regarding the second part of the hypothesis, no conclusive evidence/research material could be found that links the success of VM directly with the exposure that the professionals received to VM early on in their studies. However, other great advantages of introducing VM at a tertiary level were discovered. There seems to be a strong opinion (judging by the research done, the answers in the interviews conducted and questionnaires) that VM should form part of the curriculum of a course relating to the built environment industry.

6.

WHAT ARE THE COSTS AND BENEFITS ASSOCIATED WITH VM AND HOW CAN VM BE IMPROVED?

6.1 Introduction

This chapter is crucial to address the main question posed with this study. It will weigh the costs of VM compared to all the advantages of a VM study. A questionnaire was distributed amongst various built environment professionals and specific persons who have been part of a VM session or who have performed the duties of a facilitator. This questionnaire posed questions specifically relating to the costs of VM and the answers will be integrated with this chapter. Some of the disadvantages of VM can be overcome by employing better techniques and methods and some practical steps and methods are highlighted which will guarantee better VM results if implemented correctly.

6.2 The benefits of a VM study

VM has a lot of advantages ranging from financial benefits, to helping to build the morale of the professional team. VM will affect everyone associated with the project, otherwise known as stakeholders. The client seeks to achieve value for money, whilst the users want a product that meets their needs as effectively as possible. The project managers are to ensure that the project is on time and falls within the budgetary constraints, the contractor wishes to provide a service which will afford them an adequate profit and the designers are keen to meet the expectations of the client whilst complying with certain standards and

performance criteria. VM can address most of these needs directly or indirectly, thus bringing a degree of satisfaction to all the stakeholders involved.

6.2.1 Financial benefits of VM

Here follows a brief list of some of the benefits of VM that is somehow directly or indirectly connected with optimising the value for money for a project:

- VM creates a clearer focus on the project objectives
- VM works towards arriving at a more effective design
- Identification of alternative methods of construction and favourable adjustments to the construction timeline
- Discovery and discussion of project issues, constraints and risks involved
- Clearer project brief and decision making
- Identifies and removes unnecessary costs associated with the project
- VM deals with lifecycle costs also, not only initial project cost and provides an authoritative review of the project in its totality and not just a few elements. Future profitability can also be assessed if the lifecycle costs are known
- Decisions are made with greater confidence because it can be supported by data and defined performance criteria
- All options, alternatives and innovative ideas are considered
- VM seeks to obtain maximum efficiency ratios
- Over specification is addressed and an improved building programme can be developed leading to time being saved and ultimately savings in cost
- If properly implemented it can identify possible problems early on in the project
- It provides management with authoritative evaluations and supporting information of the project brief or design and their related capital and operation costs

(Norton et. al, 1995: 29,159) (Locke et.al 1994:5)

(www.build.qld.gov.au/sam/sam, access 5/05/2009) (May, 1994:28)

The above being said, it basically boils down to enhanced value for money for the client. Savings in costs of between 10-15% of total project costs can be achieved with the correct implementation of VM. Considering the costs of VM a return of the complete cost of the workshop can range from 1:35 to in excess of 1:50. (www.penspen.com, access 16/06/2009). The benefits of VM are not limited to the abovementioned benefits, but the above list only outlines the basic financial and other financial related benefits of VM briefly.

It is important to note that for these benefits to be fully realised it is important to implement VM as soon as possible on a project. The figure below illustrates this concept. The costs to change are much lower when the project is still in its development/design phase and the cost reduction potential is the highest early on in the project development stages.

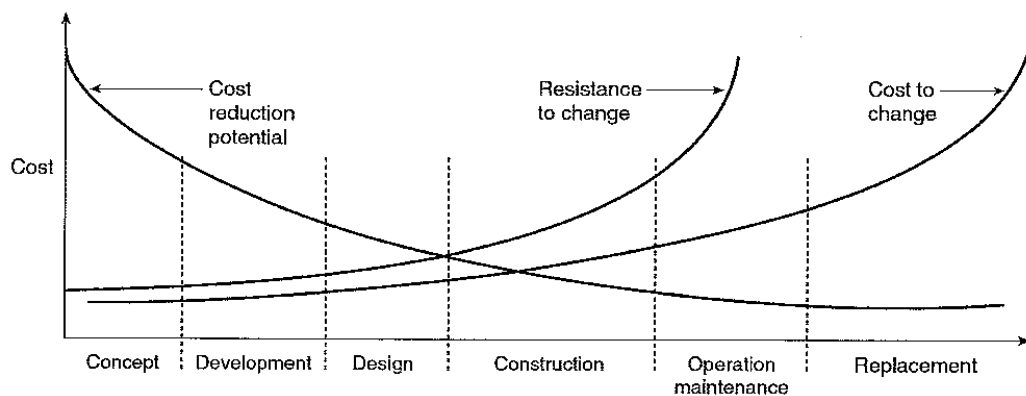


Figure 8. Opportunities and potential savings through VM (source: Ellis et.al. 2005:484)

6.2.2 Secondary and “unquantifiable” benefits of VM

Some of the more “invisible/unquantifiable” advantages that VM has, which is just as important as the above mentioned benefits are the following:

- VM provides the structure for the team to collaborate and gain the benefits of partnering
- Mutual understanding and consensus between the stakeholders are enhanced

- Improved communication and team spirit that is built between members of the professional team ensures that other objectives of the client are met (e.g. a project that is delivered on time, meets the business plan etc)
- Clear definition of roles and responsibilities
- Improved team and client relationships boosting morale of the team
- Higher efficiency can be achieved due to the multidisciplinary and multitask teamwork
- Joint ownership of solutions and commitment to implementation
- VM challenges the established views and private agendas that some of the project team members may have
- Enhanced client involvement during the development stages of the project
(www.build.qld.gov.au/sam/sam, access 5/052009) (www.ivm.org.uk/vm.htm, access 25/02/2009) (www.ogc.gov.uk/ppm_documents_construction.asp, access 25/02/2009)

The 'less obvious' advantages of VM such as those mentioned above greatly contribute to the success of a project. These benefits were highlighted as being very important by persons in the built environment industry with whom interviews were conducted regarding VM. It is important to make a qualification on all these benefits that can be achieved with VM. It is that these advantages are dependent on the correct implementation and facilitation of the VM study.

6.3 The costs and risks involved with VM

6.3.1 Possible risks involved with VM

VM is not a "failure-proof" exercise. There are certain risks that must be considered and methods should be put in place to minimise these risks. Some of these precautionary steps and methods will be discussed later in this chapter. Following are some of the possible risks involved with a VM study:

- The probability of the improper application of the methodology of VM by a facilitator that is unskilled is large. Special caution must be taken to ensure that the VM facilitator has adequate experience and possesses the qualities that were discussed in chapter four
- It can happen that there is poor representation of the project stakeholders in the VM study. VM should involve an adequate number of stakeholders
- Incorrect assumptions can be made due to inadequate and poor quality information that is circulated
- Inadequate allocation of time can lead to sub-optimal outcomes
- When VM is not adequately supported by senior management it can be very detrimental to the whole process
- There exists a risk that if VM was initiated too late in the project life cycle that the results of the study will bring about little benefits
- VM can easily be misunderstood by the participants particularly if they have no previous experience of VM
- Ambiguity on the project concept can easily arise if a VM session is not properly guided and facilitated
- It can be difficult to convince some of the stakeholders that VM is beneficial because it might be a new concept that is hard to grasp.

(McGeorge, Palmer: 1997: 113) (www.build.qld.gov.au/sam/sam, access 5/05/2009)

The results from the questionnaires were evaluated and one of the main barriers that were indicated was the lack of knowledge of VM and the improper VM methodology that is widely used, especially in SA.

6.3.2 Financial and other costs involved in VM

Even though the overall opinion of VM is that it is a low cost high benefit exercise, the costs associated with VM can not be ignored. The financial costs of

VM include the costs of obtaining and engaging a VM facilitator. Especially if it is an external facilitator there may be considerable costs involved. According to Kelly et. al (1993:58) a VM facilitator can be appointed in two ways namely

- 1.) By a contract through the engineer/architect on the project, where the architect then also selects the rest of the consultants
- 2.) Independently where the architect has no/little say in the appointment of the facilitator

A fee scale is not normally used as with the other professional fields. An estimate fee for a specific project is proposed. This estimate consists of a standard schedule of services in terms of man hours and labour rates, travel costs, reproduction and overhead costs and other related expenditure and profit. The range of the fees can be expected to be anything between 0.1% and 0.5% of the total project cost.

For a VM study it is important that it should be conducted at a venue and not at the workplace of any the participants. Hiring the venue can be relatively expensive, depending on the quality of the venue and the facilities included with the venue. Costs of each participant's attendance must also be considered. This for example can be transport costs especially if he/she has to fly in for the sessions. Administrative support costs must also be considered. Someone must be paid to type minutes, set up documentation for the sessions etc. Collecting information is also a costly business.

Besides the financial costs of a VM study there are other costs too. These are costs in time. We live in a world where time is money and where most construction projects are fast track multi-procurement projects. Many of the professionals on the team will not have the time to attend a 40 hour workshop for example because they are most likely also working on other projects simultaneously. The answers from the questionnaires indicated that very few professionals are willing to spend more than two days on VM for a project with a value of less than R50 million. Only about 50% of the persons interviewed said

they were willing to attend a 40 hour workshop for a project with a value of more than R100 million. The money lost in time should be considered. Some professionals provide their services on a time charge basis and it will be difficult for them to justify a 40 hour workshop or even the shortened two-day workshop. VM is flexible and it is not always necessary to conduct workshops that last a number of days although the longer routes are recommended for a proper study. Electronic VM is a new concept that can help overcome this issue of time and will be discussed later in this chapter.

Another cost/disadvantage of VM is that it generates a lot of follow up work for most of the consultants. The QS will have to produce new revised estimates, the architect and engineers may have to change the building design, the contract period might be reduced or elongated causing the contractor to have to revise his building programme etc. The list of extra work created through such a session is comprehensive and again the question arises as to whether the professionals have the time to properly attend to all the proposals made knowing that only a handful of the proposals will actually be implemented. VM creates a lot of paperwork that must be dealt with and processed. If VM is implemented during the design phase it can lead to a prolonged design period if the design needs to be altered to make it more cost effective.

(www.build.qld.gov.au/sam/sam, access 5/052009) (Locke, 1994:5) (Fong, Shen, 2000:322)

The diagram below illustrates the cost of VM compared to the project cost. It also gives an indication on the use of VM to reduce project cost by 10% or more. This diagram illustrates that the costs associated with VM is negligible compared to total project cost.

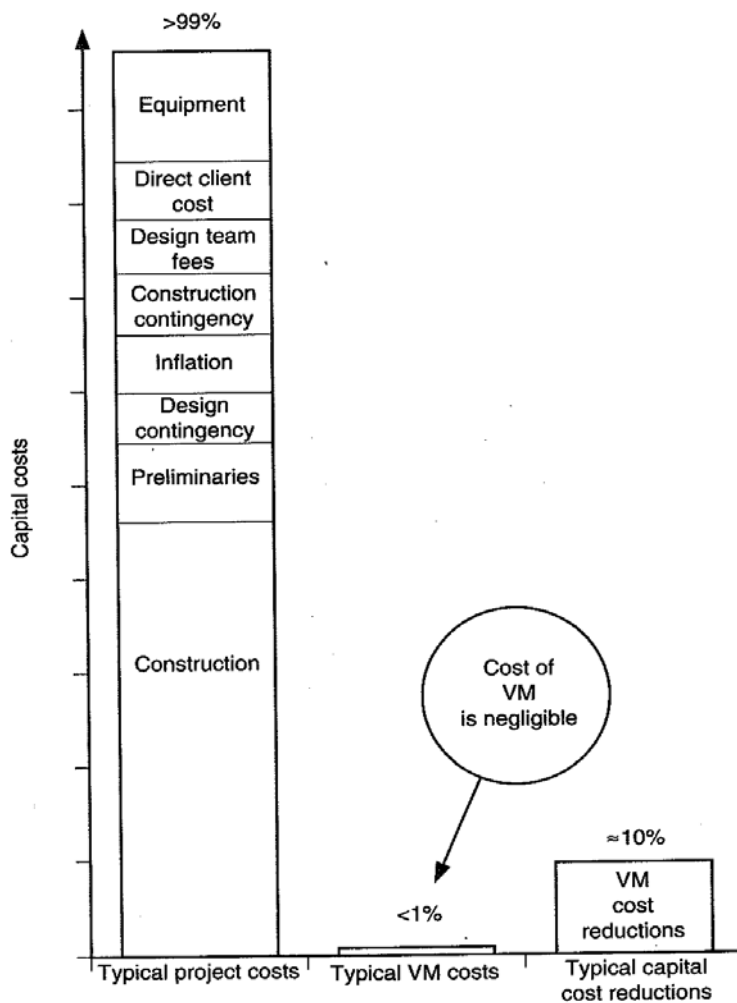


Figure 9. Cost of VM versus project cost (source: Norton et. al. 1995:27)

6.4 Methods to improve VM and to minimise associated risks

It is important to look at ways to improve VM, especially after considering the risks and costs involved. This eliminates the few excuses that a person could have for not wishing to use VM on a project. There are a vast number of methods and techniques to enhance VM which can become a study on its own. This treatise will briefly discuss and focus on only five relatively new initiatives which guarantee to improve VM as a whole.

6.4.1 Electronic VM as the way forward

In order for VM to survive a world where there is limited finance, time constraints and team members that may be geographically dispersed, it must embrace the technology that allows it to be a quick, flexible, easy and a cost effective methodology.

Electronic VM makes optimum use of technological advances such as video conferencing, etc to create a new VM delivery process that differs significantly from the traditional physical team workshop. Electronic VM makes use of concepts of 'Delphi' (a systematic interactive method based on independent inputs of selected experts) and virtual teams together with more traditional VM concepts of structured problem solving, functional analysis and the utilisation of a VM facilitator to co-ordinate the whole process. The teams will work over the internet and make use of the latest technology. During the structured problem solving stages the team members will be given tasks which must be fed back to the facilitator. The facilitator must then analyse and prepare the data before it is sent back to the team members in the next iteration. Some of the most significant advantages and disadvantages of electronic VM is listed below:

Advantages:

- + It does not require physical meetings, thus geographical constraints are eliminated
- + Takes a very short time to set up
- + No booking of accommodation/refreshments therefore saving cost
- + Very flexible in terms of time
- + More data is produced therefore more thinking time is available
- + Team members not restricted by other commitments, these can now overlap

Disadvantages:

- Written words can be misunderstood and it can take time to clarify the meaning
- Conflict can be increased because people tend to be more honest when they

are not face to face confronted with other team members. They may be less tactful

- The team members must have IT competence and the right software is required

Electronic VM reduces two major 'costs' of VM, namely the time taken to conduct the sessions and the financial costs involved with hiring the venue, paying for transport for attendees etc. It will probably still be a while before electronic VM is fully implemented, but advances and availability in specific VM software which is being developed should make it a popular new approach to VM.

(Devonport, Gronqvist, Kelly, Male, 2007: 1-13)

6.4.2 Establishing a group support system

"Group Support System (GSS) is a set of techniques, software and technology designed to focus and enhance the communication, deliberations and decision-making of groups" (Shen, Chung, 2004:209). It is a interactive computer based system that facilitates the solution of unstructured problems by a group of people that must make decisions. Shen et.al, (2004:210) identifies three main problems when implementing VM namely

- 1.) Lack of information
- 2.) Lack of participation and interaction
- 3.) Difficulty of conducting evaluation and analysis

All of the 3 above problems can be overcome by making use of GSS. The figure below illustrates how GSS technology supports VM.

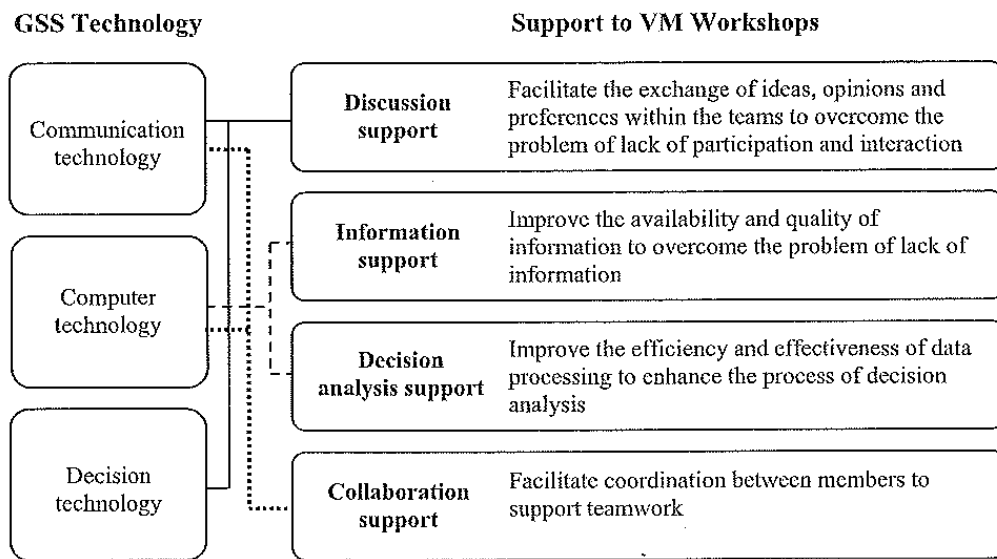


Figure 10. A framework of GSS support to VM studies (source: Shen et.al, 2004:212)

6.4.3 Developing a knowledge management system

As seen in the previous chapter VM is an integrated practice. There will always be a constant need to improve VM to ensure better outcomes. A paper by Zhang, Mao and Abourizk, (2009:788) proposes a VM knowledge management system to support the knowledge creation process, to code and retain ideas from historical VE studies and share this information with the rest of the team members and the industry. A VM study is only as good as the quality of information on which decisions are based.

6.4.4 Developing a performance measurement framework for VM studies

The realisation and successful implementation of all the benefits achieved from VM depends very much on the performance of the VM studies. The performance measurement of VM studies are rarely conducted in practice due to a lack of an appropriate and rigorous performance measurement framework. Such a framework will measure both the performance and the outcomes of the VM

study. The client needs to be convinced of the claimed benefits and be able to monitor and measure the performance to ensure that all these benefits are implemented and fully achieved. Gongbo, (2009:4) suggests a framework that will ensure the confidence of the client in the VM process and identify areas of improvement. A computer aided toolkit is being developed that will aid in this process of performance measurement.

6.4.5 Using value added/based strategies

For VM to be sustainable a value culture must be established within the organisation. The way in which such a culture is established is when the VM is managed in such a way that the value-adding results are the consistent outcome of such studies. The main factors that are considered when evaluating value added strategies are the number and timing of workshops, the duration of the workshops, the number of team members and the expertise of the VM participants. When all of the above factors are satisfactory during a VM study it will deliver favourable results. Kirk and Garret, (2008:22-25) suggests two more strategies that should be used to gain more value from the VM study. It is that the VM methodology should be followed as an entire decision making system and that no shortcuts should be taken. Secondly the users of VM should apply techniques of functional analysis, quality modelling, risk modelling, choosing by advantage (CBA) and lifecycle costing. This is very important especially for larger and more complex projects. According to Dr CP de Leeuw the time constraints does not always allow this.

(Robinson, 2008:19-25)

6.5 Summary and conclusion

Practising VM on a project has both financial benefits and benefits that are not directly linked with reducing costs, but which are nevertheless just as important.

These are benefits such as, teambuilding, senior management involvement early on in the project, etc. There are also some costs and risks related to VM. The two main costs identified in this chapter are financial costs and the “costs” of time. As seen in this chapter, the costs of conducting a VM workshop is almost negligible compared to the cost of the project and the benefits obtained from VM. The cost of VM on a project will rarely exceed 1% of total project cost and can lead to average savings of between 10 and 20% on the project (depending on correct implementation and facilitation of VM, stage during which VM is conducted and the type of project as discussed in chapter 2)

There are various methods to reduce the risks and costs associated with VM, making VM an even more viable option to use in the construction industry.

6.6 Testing of the hypothesis

The hypothesis as stated in chapter one is as follows: “VM is a lengthy process in an industry where time is money, but it has many great advantages making the two-day sessions well worthwhile. VM can be improved by better communication strategies, information circulated that is of a higher quality and using the correct methodology.”

This hypothesis is only partly true. VM is not only a lengthy process, but it involves financial costs also, such as hiring a venue, fees from the facilitator, etc. The advantages outweighs the disadvantages by far and even though time is a big “cost” with VM, no studies were conducted that shows that only the two-day VM session is well- worthwhile. Five methods were evaluated in this chapter that can improve VM and it is true that VM can be improved by better communication strategies, information circulated that is of a higher quality and using the correct methodology.

7.

CONCLUSION

7.1 Background on main problem

VM is a practise that has been in use for many decades, yet in SA most built environment professionals are only vaguely familiar with the term “value management”. VM is a process whereby the project is evaluated and scrutinised to obtain maximum value for money by following a certain methodology, the process being led by an experienced facilitator.

The economy has changed rapidly over the past few decades and intensifying competition has placed a growing importance and demand on increased efficiency, effectiveness and value for money. VM addresses these three facets effectively and directly. Unfortunately in SA the true benefits of VM has not yet been realised by all in the construction industry. Many people in the built environment industry think they know what VM is and what it entails, but in fact many misconceptions about VM exist.

The purpose of this treatise was to introduce and create awareness of authentic VM to the reader and convince him or her about the benefits of implementing VM on projects. It should eliminate the misconceptions that the reader may have had about VM, especially on the procedures to be followed and the facilitation of VM. This study should ultimately prove that VM is a truly beneficial practise that should form an integral part of a project (especially larger and more complex projects) and that it is worth investing some time and effort in the VM workshop and the process as a whole. The problem of lack of knowledge about VM in SA is also addressed by suggesting that VM should be introduced into the curriculum

of courses for students studying a course related to the built environment industry. Hopefully this treatise has sparked some curiosity and will encourage the reader to familiarise himself/herself more with VM and to implement it on a project where he or she is involved.

7.2 Summary of treatise

All the sub problems were carefully chosen and constructed to provide an answer to the main problem. The combined outcomes of the different chapters (sub problems) will prove whether the hypothesis of the main problem is true or whether it should be dismissed. The following is a short summary of the sub problems:

What is VM, when is the best time to implement it and which construction projects will benefit the most?

There are many acceptable definitions used for value management. The most commonly used description of VM was stated in chapter two which basically states is that VM is a systematic and structured process practised by people from multiple disciplines to analyse the functions of the project to achieve the best value at the lowest life cycle costs. In order to test for authentic VM there are four criteria which must be met. VM is a flexible process and can be applied at any stage of a project but the later the intervention the less beneficial it would be compared to early implementation of VM. Greater resistance to change and a detrimental impact on the construction programme are risks to keep in mind when applying VM only in later project stages. (Later meaning about more than one third into the project) There is no restrictions on the type and size of project that will benefit from VM, but benefits increase proportionally as the project size and complexity increases. There are certain fixed and variable costs associated with VM and to justify these costs, it is more advisable to use VM on larger and more complex projects.

What are the different stages involved in a proper VM workshop?

This sub problem was devised to familiarise the reader with the procedure that is typically followed in a VM workshop. It explained the different stages in detail. The seven most common and known stages were discussed together with information on how a proper workshop is conducted. It is important to note that a VM workshop is not limited to these seven stages and that there are variances on how these stages are conducted. Each project is unique, thus how these stages are applied are dependent on the circumstances encountered. These stages form the job plan which is one of the criteria that should be met for authentic VM.

What is the role of the VM facilitator and which person is best suited for this task?

This part of the treatise also deals with and addresses the part of the main problem, namely: “what does VM entail...” One of the prerequisites of a successful workshop is the use of an experienced VM facilitator. This sub problem evaluated the roles and responsibilities that the facilitator has as well as the skills required by him/her. A comparison of the advantages and disadvantages of using an internal versus an external facilitator was done, indicating that it’s more beneficial to use an external facilitator. Studies was done and reported on in this section which shows that the average quantity surveyor in does not possess all the skills and competencies required of a facilitator.

How is VM an integrated practise and should VM form part of the curriculum of courses related to the built environment industry?

By answering the above sub problem the importance and relevance of VM is reinforced. This sub problem explains how VM is a practise which is integrated with many other strategies, tools, frameworks or practises to ensure the overall success of a project. VM and these other practises are interdependent, for

example proper life cycle costing would not be possible on a project if VM principles and practises are not considered and incorporated. Ten examples of how and where VM is an integrated practise was discussed although there are many more. VM as part of the curriculum for students in the built environment industry was considered, looking at the current trends in Hong Kong. The typical learning objectives of such a subject/course were stated as well as a typical syllabus covering the basic aspects of VM. The answers from the questionnaires were almost unanimously in favour of the idea that VM should form part of the curriculum of courses related to the built environment industry.

What are the costs and benefits of VM and how can VM be improved?

This sub problem deals directly with the last part of the main problem which answers the question of whether VM is merely a futile practise. The financial and other unquantifiable advantages and benefits of VM were discussed. The costs involved with a VM workshop were also investigated. One of the largest costs is the time it takes to conduct a proper VM workshop and the creation of a lot of work for professionals who are already working on tight schedules. There are costs to the involvement of professional consultants. The risks and barriers were shortly discussed. Lack of knowledge was highlighted as one of the barriers in the questionnaires. In order to minimise the risks and eliminate any barriers a few methods to improve the whole VM process was discussed.

7.3 Conclusion

The main problem posed in this study was the following:

Value management in the construction industry: what does it entail and is it a worthwhile practice?

Here follows the hypothesis of the main problem: "Value management is an integrated, organised and structured process, led by an experienced facilitator

and broken down into various stages to enhance the value of a construction project, not necessarily only by cutting costs. The benefits of having a VM session on a project outweigh the costs by far, more so if it is implemented in the early development phases of a construction project and for larger more complex projects. Methods to improve VM exists which even further eliminates the costs associated with VM, making it even more viable.”

Five sub problems were devised to successfully support and solve the main problem posed in this treatise. Chapter two, three and four mainly addressed the part of the main question of what VM entails and the following conclusions could be drawn from these respective chapters:

VM is a structured and organised process which involves multiple disciplines. It is an analytical process which seeks to achieve value for money by analysing the functions of a project and it is not merely a cost cutting exercise. Value management can be introduced at any stage of the project development life cycle but it is more beneficial if it is implemented early on. The reason is that the cost to make changes is less and the cost reduction potential is greatly increased. VM can also be applied to any construction project but it is more worthwhile to implement VM to larger and more complex projects. The savings potential on large projects are more. Studies have shown that savings of between 10 and 15% can be achieved on large costly projects. Complex projects benefit from the pool of experts that are all present at the VM workshop and who can provide valuable inputs.

It is important to realise that VM is a structured process which requires a specific job plan and methodology to be followed. Chapter three discussed the seven phases of a typical VM workshop, namely the pre-study phase, information phase, creativity phase, evaluation phase, development phase, presentation phase and the post study phase. For authentic VM the above mentioned phases

must be adhered to. Small deviations to this job plan will exist due to the uniqueness of different projects.

Another major constituent of VM as a whole is the facilitation of the VM workshop. VM success is dependent upon the facilitation and an experienced facilitator is a prerequisite. Such a facilitator needs to possess certain skills and competencies. Studies were conducted which indicate that it is more advantageous to make use of an external facilitator compared to in-house staff.

The second part of the main question deals with whether VM is a worthwhile practice. Chapter five and six deal extensively with this part of the main problem. It was found that VM is without any doubt a worthwhile and viable practice that can enhance the value of any project. VM is integrated into many other important practices and processes. It is not an alone standing, but an interdependent practice and therefore even if a person is to argue that VM is not necessary, one should consider that it is integrated with and supports other practices and processes which are vital for project success. One of the barriers to the successful implementation of VM in SA especially is the lack of knowledge of VM. The treatise briefly investigated the introduction of VM into the curriculum of courses related to the built industry. The responses obtained from the questionnaires and interviews almost unanimously support this suggestion and it is concluded that education on VM will be a driving force for VM to go forward in SA.

The costs associated with VM compared with the benefits are almost dismissible. The costs of conducting a VM workshop rarely ever exceeds 1% of total project costs, whilst potential savings of between 10 and 15% of total project costs are possible. There are many advantages other than financial benefits and the costs that can be saved. These advantages are for example, improved team morale and communication, better teamwork, clear definition of roles and responsibilities, enhanced client involvement in early stages of the project etc.

The main costs that were identified were the time it takes to conduct a proper VM workshop and the resultant additional work afterwards. Some risks associated with VM also exist. There are identified methods to improve VM that will eliminate most of these risks and will reduce the costs associated with VM. One of the ways is the introduction and use of eVM. Even after considering the costs and barriers to VM, the advantages still far outweigh the cost of VM. VM should be commonly practised on projects, especially on larger and more complex projects to increase value for money and meet the client's expectations. It truly is a value adding practise which benefits are yet to be realised by all in the South African construction industry.

There is a need to change the attitudes of clients and the professionals in the construction industry. Clients should be more open-minded to the idea of VM. Change is a prerequisite for improvement and VM provides a perfect channel for improvement. The question is whether the industry will grab the opportunity or are they still too uninformed on the whole concept of VM? Hopefully this treatise has shed some light on the concept of VM and convinced the reader that VM is a worthwhile practise.

7.4 Recommendations for further study

Whilst compiling this treatise, a few subjects that could enjoy further attention and study arose. Here follows a few recommendations:

- Electronic VM is a new concept which could revolutionise the way in which VM is currently conducted. It has the great advantage of saving a lot of time as there is no physical workshop with all present and geographical limitations are therefore eliminated. Electronic VM is not widely practised yet and further

studies should be done to evaluate this new concept to see if it will be a practical solution to the main disadvantages of VM currently performed.

- Chapter five of this treatise briefly discussed the possibility that VM should become part of the curriculum of courses related to the built industry. This should definitely be investigated further. The built environment industry in SA would be more acceptable of VM if they had more knowledge about VM. Most professionals who completed the questionnaires or with whom interviews were conducted were in favour of the idea that VM should be taught at educational institutions to students in the built environment profession.
- A formal VM guide should be developed specifically for VM conducted in SA. The guide will stem from ideas from other countries but practises unique to the South African construction industry should be devised. Different workshop strategies should be developed for projects with a very high monetary value (R100 million or more) compared to projects with a lower monetary value (R50 million or less). The durations of the workshops should be adjusted in accordance with the value of the project. This could be investigated to see whether such a system would be practical.

BIBLIOGRAPHY

Abidin, N.Z. Pasquire, C.L. 2006. Revolutionize value management: a mode towards sustainability. International journal of project management. 12 October 2006, p.275-279

AbouRizk, S.M. Mao, X. Zhang, X. Developing a knowledge management system for improved value engineering practices in the construction industry. Automation in construction. 5 March 2009, p.776-779

Ashworth, A. 2002. Precontract studies: Development economics, tendering and estimating. Oxford. Blackwell publishing

Chung, J. K. H. Shen Q. 2004. A group support system for improving value management studies in construction. Automation in construction. 29 July 2009, p.209-212

Cloete, C.E. 2008. Classnotes- Value management and life cycle costing. University of Pretoria. Pretoria

De Leeuw, C.P. 1998. Value management internal working manual. Pretoria. C.P. de Leeuw (Pty) Ltd

Devonport, Gronqvist, Kelly, Male. 2007. Electronic value management for the 21st century. Value solutions Ltd. England

Ellis R.C.T., Keel D.A., Wood G.D. 2004. Value management practises of leading UK cost consultants. Construction Management and Economics, 26 November 2004, p.484, 489, 491

Fong, P.S. Shen, Q. 1999. Is the Hong Kong construction industry ready for value management? International journal of project management, 25 March 1999, p. 318-325

Geoffrey, Q.P. Shen Q, Yu, A.W. 2008. Pedagogy of teaching value management in and undergraduate surveying program. Value world, Volume 31, November 2008, p.6-10

Graham, D. Gronqvist, M. Kelly, J. Male,S. 2006. Managing value as a management style for project. Value solutions.

Green, S.D. Liu, A.M.M. 2006. Theory and practice in value management: a reply to Ellis et. al. Construction Management and Economics. December 2006. p.650

Kaufman, J.J. 1998. Value management, creating competitive advantage. Houston. Crisp Publications Inc.

Kelly. J, Male, S. 1993. Value management in design and construction. The economic management of projects. Glasgow. E & FN Spon Inc.

Lin, G. 2009. Developing a performance measurement framework for value management studies in construction. Value world, Volume 32, February 2009, p.4

Locke, M.B. 1994. Management of value in the British construction industry. SAVE International. London

May, S.C. 1994. Value engineering and value management. United Kingdom: The College Of Estate Management.

McElligott, W.C. Norton, B.R. 1995. Value management in construction, a practical guide. London. Macmillan Press Ltd

Principles of property maintenance. 2001. Edited by Cloete, C.E. South African property education trust. Sandton

Rains, J.A. 2008. The integration of the Japanese Tear-down Method with design for assembly and value engineering. Value world, Volume 31, November 2008, p.29

Robinson, J.L. 2008. Value added strategies to sustain a successful value improvement program. Value world, Volume 31, November 2008, p.19

Thomas, G. Thomas, M. 2005. Construction partnering and integrated team working. Oxford: Blackwell publishing Ltd

Thomson, V. 2008. The VE workshop at McGill University: Benefits for the students and industry. Value world, Volume 31, November 2008, p.13-17

Visser, R.N. 1998. Die potensieële rol van die bourekenaar in waardebestuur in die konstruksiebedryf in die republiek van Suid Afrika. Unpublished DSc thesis. Pretoria. University of Pretoria

Internet sources consulted:

http://www.alabc.org.uk/nov_02/HH%20Handout/process.pdf, access 9 February 2009

<http://books.google.co.uk/books?id=wgn55>, access 5 May 2009

http://www.build.qld.gov.au/sam/sam_web/content72_cont.htm, access 22 May 2009

<http://www.capital.dhs.vic.gov.au/valuemanagement>, access 26 February 2009

<http://www.constructionexcellence.org.uk>, access 30 May 2009

http://www.en.wikipedia.org/wiki/Lean_Construction, access 30 August 2009

http://www.ivm.org.uk/vm_sector_building.htm, access 25 February 2009

<http://www.leanconstruction.org>, access 17 July 2009

http://www.ogc.gov.uk/ppm_document_construction.asp, access 25 February

<http://www.penspen.com>, access 17 July 2009

<http://www.rics.org/NR/rdonlyres>, access 25 February 2009

<http://www.treasury.nsw.gov.au>, access 14 August 2009

ANNEXURE A
VM QUESTIONNAIRE

VALUE MANAGEMENT QUESTIONNAIRE

Definition of VM:

"VM is a systematic, multi-disciplinary effort directed towards analyzing the functions of projects for the purpose of achieving the best value at the lowest overall lifecycle costs." (Norton, 1993:13)

1.) In what professional field are you involved. Please tick the applicable block

Quantity Surveyor	<input type="checkbox"/>
Architect	<input type="checkbox"/>
Engineer	<input type="checkbox"/>
Project manager	<input type="checkbox"/>
Construction manager	<input type="checkbox"/>

2.) On a scale of 1 to 10, please indicate how familiar you are with value management, 1 being not familiar at all

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

3.) Please tick the applicable block

I have never heard of value management in construction	<input type="checkbox"/>
I have never been part of a value management session	<input type="checkbox"/>
I have worked on a project where value management has been performed	<input type="checkbox"/>
I have been part of the value management team	<input type="checkbox"/>
I have facilitated a value management session	<input type="checkbox"/>

4.) How much time would you be willing to spend on value management for a project having a value of less than 50 million rands? Please tick the applicable block

No time	<input type="checkbox"/>
One day	<input type="checkbox"/>
Two days	<input type="checkbox"/>
40 Hour work shop	<input type="checkbox"/>
More than 5 days	<input type="checkbox"/>

A project more than 100 million rands?

No time	<input type="checkbox"/>
One day	<input type="checkbox"/>
Two days	<input type="checkbox"/>
40 Hour work shop	<input type="checkbox"/>
More than 5 days	<input type="checkbox"/>

5.) What factors in your opinion is most likely to inhibit value management to be commonly practised in South Africa?

6.) Please name at least 2 methods in which value management can be improved

7.) If you have been part of a value management study before, what were the 'barriers', disadvantages or costs (not only referring to monetary costs) involved with the session?

8.) Should value management form part of the curriculum for students studying a course relating to the built industry? Please motivate your answer

ANNEXURE B

EXAMPLE OF VM WORKSHOP AND REPORT

COMPACT VALUE MANAGEMENT SESSION

OFFICE PARK PHASE 1

1. Date, time and venue

To be held at the Gateway Hotel, cnr North Reef and Atlas Roads, Elandsfontein (entrance from North Reef Road) from 11:30 to 18:30 (or slightly later) on Thursday 22 January 2008

2. Facilitator

The facilitator will be

3. Participants

<u>Person</u>	<u>Company</u>	<u>Tel</u>	<u>Fax</u>	<u>E-mail</u>
Geoffrey Johnson	QIP Project Management	011-2336800	011-2336832	
David Gurno	QIP Project Management	011-2336800	011-2336832	
David Mthali	QIP Project Management	011-2336800	011-2336832	
Gregory Mthali	QIP Project Management	011-6468802	011-6468194	
Russell Mthali	QIP Project Management	011-6468802	011-6468194	
Gregory Mthali	QIP Project Management	011-6468802	011-6468194	
Geoffrey Johnson	QIP Project Management	011-6428751	011-6426792	
David Gurno	QIP Project Management	012-4603304	012-3463301	
Russell Mthali	QIP Project Management	011-5014760	011-5014769	
Geoffrey Johnson	QIP Project Management	011-5014760	011-5014769	
Geoffrey Johnson	QIP Project Management	011-2348857	011-2348867	
Geoffrey Johnson	QIP Project Management	011-4523720	011-4525476	
Geoffrey Johnson	QIP Project Management	011-4352205	011-4355007	
Geoffrey Johnson	QIP Project Management			
David Gurno	QIP Project Management	011-7040540	011-7053905	
Geoffrey Johnson	QIP Project Management	011-7040540	011-7053905	
Geoffrey Johnson	QIP Project Management	011-7040540	011-7053905	

It is imperative that all participants should attend for the full duration of the exercise

4. Agenda

<u>Time</u>	<u>Action</u>
11:30 to 12:00	Arrival
12:00 to 12:45	Introductions Introduction to value management
12:45 to 12:30	Objectives
12:30 to 13:30	Information phase (brief presentation by
13:30 to 14:30	Light lunch and informal discussion
14:30 to 15:15	Information phase (continued)
15:15 to 15:45	Tea / Coffee
15:45 to 17:00	Creativity phase
17:00 to 18:00 (or slightly later)	Development phase

The agenda is flexible and will be adjusted as the need arises

5. Australian / Japanese system

We will be using the Australian / Japanese system of value management where the creativity (brainstorming) session is the core of a successful study

6. Compact value management workshop

It was decided to undertake a compact value management workshop rather than a full blown session due to time constraints and the fact that most participants have a sound knowledge of the development and the fact that construction will already be underway

7. Late arrivals

Late arrivals cause havoc in this type of value management workshop. Please do not arrive late

8. Objectives

A first attempt at the objectives of the session is as follows:

To agree on action to improve the financial viability of Malakite Office Park Phase 1 taking into account the other phases of the project and to highlight possible improvements and any shortcomings of the development"

9. Background

Ltd is to be appointed to build the six blocks in Phase 1 of the project and will hopefully commence construction on 12 January 2009

The developer, Ltd, found that the value management exercise on the "The Nicol" was valuable in assessing the issues and generally improving the development and have therefore called for a similar exercise to be conducted for Office Park Phase 1

10. Study existing documentation

All participants are required to study the drawings prior to the workshop in order to fully acquaint themselves with the development. However, the architects, civil and structural engineers, the electrical engineers, mechanical engineers and the wet services engineer will be called upon to briefly explain their design philosophies and installations whereafter any of the other disciplines will be given the opportunity to highlight important aspects

11. Annexure

Herewith a short introduction to value management, you will, early in the new year be given extracts from the financial viability study

12. Relevant drawings and / or documentation

All disciplines are to bring along copies of relevant drawings and documentation.

The architects are requested to bring along for each participant an A3 booklet with plans, some elevations and any other relevant detail. In addition, the architect should have available one full set of drawings

13. Homework

Kindly prepare for yourselves a list of the following to be used as a reminder during the creativity session:

Possible savings in cost (whether outrageous or not)
Possible improvements
Shortcomings of the development

14. Enquiries

(facilitator)

15. Car parking

Ample parking is available

INTRODUCTION TO VALUE MANAGEMENT

INTRODUCTION TO VALUE MANAGEMENT

The Value Management (VM) workshop presents a unique opportunity to develop an action plan which will ensure that the completed development supports the needs and aspirations of all stakeholders

VM is a facilitation of a systematic multi-disciplinary creative process to generate alternatives with the object of maximising the functional and economic value of a project and, in the case of a commercial development, to enhance the return on the investment

VM is concerned with bridging the gap between needs and wants, eliminating wastage and unnecessary cost, improving communications, establishing appropriate standards / specifications and generally ensuring value for money

1. Information phase

The initial segment of the study is devoted to developing a comprehensive understanding of the project and proposals. This is the information phase of the study. Brief presentations are made by key stakeholders to ensure that the entire study group is fully aware of the rationale behind the project and the amount of planning and preliminary work completed to date

The information previously generated in getting the project to its current stage forms part of the information underpinning the VM study and should be reviewed prior to the workshop

2. Objectives phase

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

The common ground already established, the decisions that are "locked in" and the constraints within which solutions must be found will be defined. The participants will be asked to spell out the project objectives, basic assumptions, underlying performance criteria, risks, assumed standards, etc. Opportunities and constraints are explored

With regard to areas / issues which are not clearly defined or quantifiable, the analysis centres on establishing what actual performance, features, etc are required, so that appropriate specifications and / or recommendations can be developed

3. Functional analysis phase

In this phase the functional, rather than the physical characteristics, of a development is analysed. This phase is concerned with identifying those items / procedures, which most likely, through further investigation, would yield the required results

4. 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

5. 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

6. Development phase

The ideas / alternatives identified in the evaluation phase are technically developed and analysed during the development phase by the participants and / or members of the professional team. The development phase is generally not a workshop activity but is dealt with in the office environment

7. Reporting and recommendation phase

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

VALUE MANAGEMENT ACTION LIST

No Item Action

ARCHITECTURAL

Definite

1	Increase parking ratio	GS
2	Optimise the bulk	GS
3	Implement meaningful green design	GS
4	Keep all ceilings voids less than 800mm	GS
5	Decide on glass spec in atrium curtain wall	GS/TJ/GdL
6	Review external directional signage	GS
7	Reduce size of LV chamber	TvG
8	General shutter concrete to soffits of basements	GS/GdL
9	Reduce width of escape stairs from 1.2m to 1.1m	GS/GdL
10	Optimise positions of LV/HVAC/generator rooms	TvG/GS
11	Landscaping to hotel ring road	GS
12	Arrange a buildability session with contractor with regard to structure	GS/WW
13	Investigate extent of canopy	GS/GdL
14	Rationalise glass pane sizes	GS/GdL
15	Security gates to complex	GS/GdL
16	Ablutions for maintenance staff	GS/GdL
17	Rationalise roof slab over gatehouse	GS/GdL
18	Remove porcelain tiles from fire stairs except communication stair	GdL/GS
19	Provide single handrail to fire escape stairs	GS/GdL
20	Conduct substantial investigation into green building	GS/TvG/TJ

Investigate

21	Add additional basement to building 5	WW/GdL
22	Enclose escape stairs	GS/GdL
23	Unenclose escape stairs	GS/GdL
24	Provide additional escape stair from first floor of coffee shop	GS/GdL
25	Allow for future lift/s in small buildings	GS/GdL
26	Change from deep lifts to wide lifts	GS/TJ
27	Simplify atrium staircase	GS/GdL
28	Reduce size of atrium	GS/GdL
29	Simplify atrium design	GS/GdL
30	Investigate skylight size and glazing	GS/GdL
31	Change hollow walls to solid walls (to increase rentable area)	GS/GdL
32	Change concrete lift shaft walls to brickwork	WW/GdL
33	Review the level of basement finishes	GS/GdL
34	Change basement to a wet basement	WW/GdL
35	Enhance finishes to public areas	GS/GdL
36	Combination of mild steel and stainless balustrades in atrium	GS/GdL
37	Omit IT room and tea kitchen	GS/GdL
38	Substantially enhance the landscaping budget	GS/GdL
39	Review external works as a whole	GS/GdL
40	Review paving block and premix	GS/GdL
41	Review the location of refuse store	GS

42	Review a possible location for a gymnasium	GS
43	Omit tiles to external façade	GS/GdL
44	Reduce stonework to external façade	GS/GdL
45	Enhance aesthetics of culvert	GS/WWW/GdL
46	Change ceiling boards to 1200 x 600mm ilo 600 x 600mm	GS/GdL
47	Change light fittings to 1200 x 600 ilo 600 x 600mm	TvG/GdL
48	Rationalise scope of skylights	GS/GdL
49	Decrease number of kitchens	GS/GdL
50	Design for multi-tenancy in buildings 1 - 4	GS
51	Provide alternative escape stair in buildings 1-4	GS/GdL
52	Omit off-shutter concrete canopy and replace with steel and aluminium components	GS/WWW/GdL
53	Replace spandrel panels with brickwork	GS/GdL
54	Move glass line on top floor of blocks 5&6 to increase rentable area	GS/GdL
55	Review glass enclose staircase	GS/GdL
56	Alternative construction method for external façade	GS/GdL
57	Reduce height of toilet partition walls	GS/GdL
58	Introduce double glazing	GS/GdL
59	Introduce high level glass for natural lighting (green)	GS/TvG/GdL
60	Reduce height of doors from 2.4m to 2.1m	GdL/GS
61	Review the recycle materials contents in the project	GS
62	Review roof edge detail	GS/GdL
63	Change aluminium cladding to zincaluminium facias	GS/GdL
64	Consider natural light in lighting design	GS/TvG/GdL
65	Change rebated ceiling tiles to flush	GS/GdL
66	Green all exposed roof slabs	GS/GdL
67	Review waterwise sanitary fittings	GS/GdL
68	Reduce lock spec	GS/GdL
69	Omit screeds	GdL
70	Increase natural lighting to basements	GS/TvG/GdL
71	Paint fairfaced walls to basements (fairface as elsewhere suggested)	GdL/GS
72	Consider steel fire escape ilo concrete	GdL/GS
73	Omit first level of coffee shop	GS
74	Introduce water features	GS/GdL
75	Introduce car wash bays in basements	GS/GdL
76	Epoxy paint utility areas	GdL/GS
77	Omit shopfront to lift lobby in basements	LZ/GdL/GS
78	Alternative specification for doors in office areas	GS/GdL
79	Review extent of louvred doors or special plant room doors	GS
80	2400mm doors to be solid not semi-solid	GdL/GS
81	Review height of doors	GdL/GS
82	Construct the cores out of drywall not brickwork	GS/GdL
83	Simplify staircase for higher buildings	GS/GdL
84	No hot water (ie no geysers)	GS/GdL
85	Tiling to toilets up to dado height (not full heights)	GdL/GS
86	Remove full height aluminium shopfronts from atrium perimeters	GdL/GS
87	Allow for bullet proof glass to gatehouse	GS/GdL
88	Consider structured parking	GS/GdL

Not relevant

89	Provide archive and record room on all floors	
90	Omit roller doors to basement entrance	
91	Omit grilles to basement openings	

92	Consolidate service shafts	
93	Is quantity of sanitary fittings at municipal minimum?	
94	Omit the ceilings to use the exposed slab as a heat sink	
95	Omit data sleeves	
96	Revise parking bay width from 2.5m to 2.4m	
97	Revise size of male and female toilets to increase useable space	
98	Reduce floor to ceiling height	
99	Provide neon signage and firemen's switches	
100	Find a use for the roof slab	
101	Paving ilo of surface beds in basements	
102	Cubicle doors to be hollow core	
103	Raised access flooring to data rooms/server rooms	
104	Utilise attenuation dams for landscaping purposes	

CIVIL

Definite

105	Ensure that road servitudes are submitted timeously	BA
-----	---	----

Investigate

106	Provide attenuation dams to phase 1	BA
107	Harvest stormwater	BA

Not relevant

108	Use attenuation tanks ilo water storage tanks	BA
-----	---	----

ELECTRICAL

Definite

109	Classify intrusion alarms as TI	TvG
110	Refine length of LV cables on site	TvG
111	Decrease lighting levels in basements if possible	TvG
112	Sort out flood lights and/or downlighters	TvG/GS
113	Investigate Eskom incentives/subsidies for energy efficient installations	TvG
114	Make decision on light fittings	TvG/GS
115	Back up generator for gatehouse	TvG
116	Revise fifth draft of specification (electrical)	TvG
117	Earthing to data rooms	TvG
118	Reduce heat load from equipment and lighting (from 40W/m ²)	TvG
119	Standby generator is by tenant	TvG
120	Check that electrical budget includes municipal connection fee	TvG/GdL

Investigate

121	Classify access control as TI	TvG
122	Reticulate ground floor foyer through slab (electrical)	TvG
123	Install undertile heating in atrium reception	TvG
124	Underfloor heating for entire atrium	TvG
125	Provide bicycle parking bays and change rooms. Also motorcycle bays	TvG

126	Move LV room to mini-sub corner of building	TvG
127	Minimise cable routes by introducing sleeves in slabs	TvG
128	Reduce office lighting levels to 300lx	TvG
129	Introduce automated light dimming in common areas	TvG
130	What other uses can we find for solar panels?	TvG
131	Are motion detectors provided? Which areas?	TvG

Not relevant

132	Provide power skirting as a standard	
133	Classify all office lights as T1	
134	Revise ring main (electrical) - options	

FIRE

Definite

135	Clarify whether sprinklers are required for second basement	LZ
136	Reduce carpet fire rating in sprinkler protected buildings	GS

Investigate

137	Fire protect communication stair blocks 5&6	GS/GdL
138	Install fire water storage tanks due to possible poor water pressure	LZ/GdL

Not relevant

139	Specialised fire protection to data/server rooms	
-----	--	--

MECHANICAL

Definite

140	Clarify whether mechanical ventilation is required for second basement	TJ
141	Check position of toilet extract ducts relative to office windows	TJ
142	Firm up sizing of lifts shafts	TJ
143	Update airconditioning budget	TJ

Investigate

144	Install local canopy over atrium reception	TJ/GS
145	Install independent fresh air heating/cooling system	TJ
146	Relax the HVAC temperature range	TJ
147	If toilet division walls are reduced, simplify toilet extract	TJ
148	Investigate humidity control	TJ
149	Investigate positioning of equipment on roof slab in higher buildings	TJ
150	How is the switching on and off of AC controlled?	TJ

Not relevant

151	Separate heating system to cooling system	
152	Compare current aircon cost with conventional system	
153	Investigate precinct cooling ilo self contained plant for buildings	

154	Window units (aircon)	
-----	-----------------------	--

OTHER

Definite

155	Paraplegic fittings cannot be part of TI	GS
156	Confirm if AC in data rooms should be TI	TJ

Investigate

157	Acquire the site behind the hotel site	GdL
-----	--	-----

Not relevant

158	Introduce incentives for savings	
-----	----------------------------------	--

QUANTITY SURVERYING

Definite

159	Review parking rentals	GdL
160	Review office rentals from current R120 net	GdL
161	Determine ratio of shade net and open parking	GdL
162	Determine viability of shade net and open parking	GdL
163	Review tenant allowances	GdL
164	Review discrepancies between fifth draft specification and architect's new specification	GdL/GS
165	Incorporate architect's spec (as approved) into budget	GdL/GS
166	Review cost of capital over building period	GdL

Investigate

167	Omit plaster and paint in basements and add fair face brickwork	GdL
168	Review wall plaster finish (one or two coats)	GdL
169	Review timber trusses ilo of steel	GdL/WW
170	Compare feasibilty of 2 and 4 storey buildings	GdL
171	Smoking balconies rentable?	GdL

Not relevant

172	Review intial return requirements	
173	Comparison between concrete slab and steel roof	
174	Manual roller shutter doors ilo automatic	
175	Venetian blinds as TI	

STRUCTURAL

Definite

176	Insulate exposed roof slabs	TJ/WW
177	Review the concrete mix design and shuttering design for the off-shutter components	WW/GS

Investigate

178	What are the waterproofing requirements under the surface bed?	WW
179	Size foundations to carry future floor	WW/GdL
180	Review 50mm screeds	WW
181	Ground floor slab insulation	TJ/WW
182	Roof slab insulation	TJ/WW
183	Roof slab insulation under screed not under slab	TJ/WW
184	Omit gutters from steel roof	WW/GdL
185	Decide on piling/conventional for buildings 5&6	GdL/WW
186	Reduce high load areas of slabs	WW/GdL
187	Add additional level to buildings 3 & 4	WW/GdL
188	Add further levels of structured parking	GS/GdL

Not relevant

189	Attenuate stormwater on the roofs	
190	Insulate slab over balconies	
191	Reduce slab thickness	
192	Investigate post-tension slabs	
193	Investigate changing grid	

OFFICE PARK VALUE MANAGEMENT REPORT

16 March 2009

QUANTITY SURVEYORS
PROPERTY VALUERS

Note:

- Unless otherwise stated, the extras and savings hereinafter stated, are for the entire Phase 1 development (all blocks)
- The estimated extras and savings on construction cost is reported hereinafter and excludes variation, other than construction cost, to the total capital investment related to professional fees, cost of construction, etc.

Item	Description	Action	Minimum Saving R	Maximum Saving R	Minimum Extra R	Maximum Extra R	Initial response
1/ 88	<p>Increase parking ratio / Consider structured parking</p> <p>Parkade proposed with 96 additional parking bays (structure and soft roof over is 3 880m² in extent) This increases the parking ratio to 4,8 per 100m² of rentable area Construction cost of parkade is estimated at R6,3 m including a soft roof The alternative which is now being considered is as above but sunk into the ground (open basement) with only the upper floor protruding above the ground. The estimated construction cost of this alternative is R7 450 000 including the soft roof. The cost of the soft roof on its own is R2 225 000</p>		0	0	6,300,000	7,450,000	Parkade to proceed. Employer to decide on roof requirement
2	<p>Optimise the bulk</p> <p>Architect stated that it is not possible to further optimise the bulk due to parking constraints Refer to Annexure A for calculation of bulk by architect</p>		0	0	0	0	
3/ 20	<p>Implement meaningful green design / Conduct substantial investigation into green building (cost reported elsewhere)</p> <p>The architect reports as follows: In hand: <ul style="list-style-type: none"> * Solar powered geysers ilo electric (refer to item 84) * Storage of storm water for irrigation purposes (refer to item 107) * Energy efficient facade comprising performance glass (where required) and cavity walls (refer to items 5, 31 and 5B) * Shading to windows (refer to items 58, 62/63) * Energy efficient lighting (refer to item 118) * Lighting to be activated by motion sensors or light sensors (refer to items 129/131) * Insulation of the roof slab (refer to items 176/182/183) * Energy efficient HVAC system (refer to items 145 and 150) * Non use of cfc producing materials, asbestos, etc </p>		0	0	0	0	

Item	Description	Action	Minimum Saving R	Maximum Saving R	Minimum Extra R	Maximum Extra R	Initial response
	<p><u>Proposed:</u></p> <ul style="list-style-type: none"> * Enhanced landscaping of outside areas (refer to items 11 and 38) * Landscaped roof slabs (refer to item 66) * Insulation to ground floor slabs (refer to item 181) * Provision of bicycle parking bays and change rooms (refer to item 125) * Implementation of a green construction management plan * Implement a strategy of using re-cycled material where possible (refer to item 61) * Use waterwise sanitary fittings (refer to item 67) * Reduce office lighting levels (refer to items 59/64, 111 and 128) * Solar powered external and street lighting (refer to item 130) * Relax the HVAC temperature range (refer to item 146) 		0	0	0	0	
4	Keep all ceilings voids less than 800mm						
	Yes. Architect to implement						
5	Decide on glass spec in atrium curtain wall		0	0	160,000	810,000	
	Solavue to atriums only: R160 000						
	All glass areas : R810 000						
	No material saving on air conditioning						Not accepted by Employer
6	Review external directional signage		0	0	0	0	
	Architect to note						
	Allowance in budget: R1 040 000 which includes in signage legally required , directional signage, corporate signage and precinct signage						
7	Reduce size of LV chamber		0	0	0	0	
	Implemented. No change to budget						
8	General shutter concrete to soffits of basements		40,000	40,000	0	0	
	Architect recommends general shutter finish painted to ceilings of basements						
	The saving in construction cost is estimated at R40 000						Not accepted by Employer. To be smooth formwork finish with paint
9	Reduce width of escape stairs from 1.2m to 1.1m		0	0	0	0	
	Architect's response: In the light of pending legislation this saving is not recommended. It is probably also too late to effect this proposal						
10	Optimise positions of LV/HVAC/generator rooms		0	0	0	0	
	Apply logic of Block 1 to balance of blocks. No cost implication						
11	Landscaping to hotel ring road		0	0	0	0	
	Give attention to this matter under hotel development						
12	Arrange a buildability session with contractor with regard to structure						
	A buildability session has been arranged for Tuesday 3 March 2009. To be attended by S/P, TPSP, Del(QS, Crossw@ll AConsult and the contractor						Buildability session to be arranged by SIP
13/ 52	Investigate extent of canopy / Omit off-shutter concrete canopy and replace with steel and aluminium components		0	0	1,350,000	1,350,000	

Item	Description	Action	Minimum Saving R	Maximum Saving R	Minimum Extra R	Maximum Extra R	Initial response
	If canopies are changed to steel and aluminium, it will result in additional construction cost of approximately R1 350 000						Not accepted by Employer
14	Rationalise glass pane sizes Noted. Architects report that they have attended to this and that they will also discuss this with the subcontractor when selected		0	0	0	0	
15	Security gates to complex Allowed in budget. Design to follow		0	0	0	0	
16	Ablutions for maintenance staff Yes Now part of gate house (will be reported in cost report)		0	0	0	0	Only single toilet to be provided
17	Rationalise roof slab over gatehouse Budget for gate house: R750 000. Estimated construction cost of gate house per drawings received on 27 February 2009: R2,8m		0	0	2,050,000	2,050,000	Employer accepts
18	Remove porcelain tiles from fire stairs except communication stair Yes Option 1 : Steel chequer plate painted: Approximately the same cost as budget Option 2 : Concrete with untinted granolithic finish: Saving of R185 000		185,000	185,000	0	0	Untinted granolithic accepted
19	Provide single handrail to fire escape stairs Not practical. Blocks 5 and 6 have glass		0	0	0	0	
21	Add additional basement to Building 5 Estimated additional construction cost approximately R3,25 m. Due to construction process already underway, this proposal cannot be implemented		0	0	0	0	Not accepted by Employer
22/ 23/ 55	Enclose escape stairs / Unenclose escape stairs / Review glass enclosed staircase Blocks 1 to 4 not enclosed, but Blocks 5 and 6 are enclosed Mr Leon Zeller states that there is no option but to enclose		0	0	0	0	Structural scheme for staircases to be rationalised
24	Provide additional escape stair from first floor of coffee shop Client has now instructed architect to increase the size of the coffee shop. This will necessitate additional fire escape. The estimate of the construction cost of the coffee shop is R2 050 000 Budget is R750 000		0	0	1,300,000	1,300,000	New design. Will influence cost. Rental to be taken into financial viability
25	Allow for future lifts in small buildings Not required		0	0	0	0	

Item	Description	Action	Minimum Saving R	Maximum Saving R	Minimum Extra R	Maximum Extra R	Initial response
26	Change from deep lifts to wide lifts Currently two wide stretcher lifts provided per building (Blocks 5 and 6) If client and architect are prepared to accept two different widths of lifts (door widths) then a saving of approximately R100 000 per block (ie Blocks 5 and 6) can be anticipated		200,000	200,000	0	0	Door widths to be same. Two wide lifts required Provide alternatives (depth) Cabins to be high quality
27/83	Simplify atrium staircase / Simplify staircase for higher buildings This only applies to Blocks 5 and 6. New design provided. Only slight saving in construction cost		0	0	0	0	Design development
28/29	Reduce size of atrium / Simplify atrium design Option 1: New slab over atrium (Blocks 5 and 6) at 2nd floor level only (126m ² per building). Total estimated construction cost R540 000. Return approximately 25% For every one new slab the parking ratio will be reduced by 0,08 Option 2: New slabs over atrium (Blocks 5 and 6) at 2nd and 3rd floor level. Refer to the above Will tend to reduce the impact of the atrium. Architect not keen on this suggestion		0	0	540,000	540,000	Not accepted by Employer
30/48	Investigate skylight size and glazing / Rationalise scope of skylights Architect states that if skylights are too small, the effect is lost. Architects have already reduced the total area of the		0	0	0	0	
31/54	Change cavity walls to solid walls (to increase rentable area) / Move glass line on top floor of Blocks 5 and 6 to increase rentable area Option 1: Rentable area gained if solid in lieu of hollow walls is 226m ² @ R120/m ² x 12 = R325 353 additional net annual income which equates to R3 253 536 if capitalised at 10% Option 2: If the glass is increased by 100mm (vertical) the additional cost is R75 000 which, when capitalised at 10%, equates to a capitalised value of R2 000 000		0	0	75,000	75,000	Stay with cavity. Increase window size vertically by 100mm. Adjust rentable area
32	Change concrete lift shaft walls to brickwork Structural Engineer does not support this proposal Cost saving would be approximately R250 000		250,000	250,000	0	0	Not accepted by Employer
33	Review the level of basement finishes This proposal is not supported except for ceiling finish (refer to item 8)		0	0	0	0	Not accepted by Employer
34	Change basement to wet basements Cost saving is approximately R325 000. If only Blocks 3 to 6, then a cost saving of approximately R195 000		195,000	325,000	0	0	Not accepted by Employer
35	Enhance finishes to public areas It was suggested that the architect should come up with proposals. The architect reported that he was not yet in a position to quantify this Note by QS: Proposals to be within the accepted budget	GS	0	0	0	0	