A FRAMEWORK TO ENHANCE VALUE MANAGEMENT APPLICATION IN HOTEL REFURBISHMENT PROJECTS IN SRI LANKA

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ABSTRACT

Refurbishment offers profound avenues for mitigating contemporary issues attributed to buildings improve facilities and prolong building life span. Nevertheless, refurbishment projects are characterised with uncertainty and complexity that result in the subvert of value for money. In this context, value management (VM) is endorsed as an approach to optimise value for money of construction projects. Enhancing VM application in refurbishment projects seems less, even though employing VM application in new building projects continues. This research therefore, sets out to develop a framework to enhance VM application in hotel refurbishment projects in Sri Lanka, since refurbishment projects that have employed VM are comparatively high in hotel sector. Data was collected through semi-structured interviews with 18 participants, documents review and observations. The manual and code based content analysis was used for data analysing. The study revealed that VM is employed in an ad-hoc manner, primarily as a cost reduction exercise. The VM workshops adopted for the case studies were derivatives of the standard SAVE 40-hour job plan and contractors' change proposal. However, this study proved that the ad-hoc application of VM could reduce the project cost on average by 6.81%. Nevertheless, the ad-hoc VM studies contributed to time overruns of 1 to 3 months. Although certain solutions were practiced to overcome these challenges, the full benefits of VM can be realised by enhancing VM application. Hence, the current study introduced a framework for enhancing VM application in hotel refurbishment projects in Sri Lanka by incorporating strategies on raising awareness, training and development on VM, choosing the appropriate timeframe to apply VM, choosing the appropriate composition for the VM team, choosing the appropriate VM job plan and enabling legal provisions and assistance from regulatory bodies. Further, the benefits that can be obtained from successful VM application were also presented.

Keywords: *Hotels, Refurbishment Projects; Value for Money; Value Management*

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ABBREVIATIONS

BOQ	Bill of Quantities
CIDA	Construction Industry Development Authority
CIRIA	Construction Industry Research and Information Association
CVS	Certified Value Specialist
GDP	Gross Domestic Product
ICTAD	Institute of Construction Training and Development
IDP	Integrated Design Process
MEP	Mechanical, Electrical and Plumbing
QSR	Qualitative Solutions and Research
SBD	Standard Bidding Document
VA	Value Analysis
VE	Value Engineering
VM	Value Management
VP	Value Planning
VR	Value Review

CHAPTER 01

1 INTRODUCTION

1.1 Background

Maintenance of the buildings and preservation of the usable conditions is required to ensure the value as well as the functionality of buildings (Puķīte & Geipele, 2017). However, maintaining the value of buildings is increasingly challenging with the growth of aged building stocks, which has forced building owners to seek solutions for improving building condition (Babangida, Olubodun & Kangwa, 2012). Therefore, refurbishment has a substantial role in improving existing buildings and in turns enhancing the value of them. However, the term "refurbishment" has been loosely defined in past literature. As a result, over the history, attempts have been made to formulate a specific definition for refurbishment (Mansfield, 2002). The author further interpreted refurbishment as a physical process, in which the boundaries between the terminologies such as repair, replacement and renewal have not been precisely defined. Amongst the other definitions, Rahmat and Ali (2010) described that refurbishment involves upgrading, alteration, extension and renovation of existing buildings for improving facilities and prolonging building lifespan. Moreover, Rasmussen and Birgisdottir (2016) explained that refurbishment of buildings refers to construction activities, which are aimed at improving the standard of buildings by enhancing comfort and reducing operational costs. Regardless of the attempts undertaken to define the term refurbishment, Vilches, Garcia-Martinez and Sanchez-Montañes (2017) pointed out that alternative terminologies such as refurbishment, retrofitting, renovation, repair or restoration are still being used parallelly.

Many factors have contributed to create an increased demand for refurbishment projects. According to Aikivuori (1996), the primary reasons for demanding refurbishment include the failure in buildings, changes in the building usage, optimisation of economic factors, subjective features and change of circumstances. Rise of the ageing building stock, scarcity of land for new construction, adoption of building regulations and requirements on compliance with new standards also have fostered an increased demand for refurbishment projects lately (Egbu, Marino,

Anumba, Gottfried & Neale, 2002). Moreover, the demand for refurbishment projects has escalated due to the emphasis on sustainability (Juan, 2009).

The benefits yielded through refurbishment projects have been widely discussed in the mainstream literature with comparison to new constructions and demolitions. As expressed by Power (2010), refurbishment projects are economical and have less adverse impacts on environment compared to demolition and new construction. Further, refurbishment offers comparatively notable economic, social and environmental benefits over demolition, such as modernising of buildings and enabling energy saving measures (Gohardani & Björk, 2012). Hardie, Miller and Khan (2011) also asserted that refurbishment contributes to extend the useful life of the building.

Supporting this notion, Egbu et al. (2002) pointed out that despite the exemplified benefits offered by refurbishment, these projects are sophisticated and uncertain to manage. Juan (2009) also established this view by stressing that compared to new buildings, majority of the refurbishment projects are regarded to be of high risk, uncertainty and difficult coordination. Arain (2005) identified twelve (12) most significant challenges associated with refurbishment projects and among them unanticipated time overruns, incurrence of high costs and difficulty of managing due to simultaneous operations conducted by owners are notable. Therefore, the emphasis should be given on managing the uncertainty and complexity of refurbishment projects (Rahmat & Ali, 2010). Further, compared to new buildings, refurbished buildings are responsible for extra ongoing maintenance costs (Mansfield, 2009). Jensen and Maslesa (2015) also pointed out that lack of simple, yet holistic tools for assisting building owners on decision making during the inception and initial stages of the project is one of the challenges to building refurbishment projects. There is a necessity to overcome these challenges and achieve value for money in refurbishment projects. From another perspective, VM is a methodological management style for improving project value (Male, Kelly, Gronqvist & Graham, 2007). Moreover, over the history, VM has been successfully applied in many construction projects to conquer challenges associated with them (Kelly et al., 2014; Lin & Shen, 2006; Male et al., 2007).

Numerous definitions on VM have been offered through literature and amongst those definitions, VM is a systematic approach, which encompasses the "value process during the concept, definition, implementation and operation phases of a project by encompassing a set of systematic and logical procedures and techniques to enhance project value throughout the life of a facility" (Potts & Ankrah, 2013, p.104). VM is considered as "a service that maximises the functional value of a project by managing its development from concept to use through the audit of all decisions against a value system determined by the client" (Kelly et al., 2014, p.31). In the mainstream literature, VM is often associated with the terminologies value planning (VP), value engineering (VE) and value review (VR) or value analysis (VA) (Perera, Karunasena & Selvadurai, 2003; Potts & Ankrah, 2013). In the construction industry, VM and VE are used interchangeably to label a process of assessing the functions of projects to confirm that the project is executed effectively (Al-Yami & Price, 2005; Ilayaraja & Eqyaabal, 2015). The VM job plan presents the road map, which defines the necessary tasks and determines the most economical set of functions (Assaf, Jannadi & Al-Tamimi, 2000). The authors further contended that the job plan enables the VM study to determine the major components of unnecessary costs and to pursue alternative avenues of executing the same function.

Lin and Shen (2006) stated that VM can reduce costs while enhancing the performance of the project. As pointed out by Perera, Hayleys and Kerlin (2011), VM process is capable of ensuring a common understanding among all participants to facilitate smooth management in construction projects. Lin and Shen (2006) explained that VM has been applied in many new building construction projects to overcome challenges including budget constraints, time overruns, safety concerns and environmental impacts. Moreover, the attempts to elevate the value for money in buildings should be materialised on the understanding of factors that create impact on the ultimate value of the project, which necessitates the selection and application of appropriate techniques (Best & De Valence, 1999). When building refurbishment projects are considered, in order to deliver value for money, the solutions should assess in the light of economic, legislative, climatic, social, ecological and political factors to satisfy the client (Kaklauskas, Zavadskas & Raslanas, 2005). Since VM is effectively applied in

construction projects and can be employed at different building life cycle stages (Al-Yami & Price, 2005), VM can provide ideal solutions to overcome the challenges associated with refurbishment projects and thereby deliver value for money.

Compared to other sectors, refurbishment is vital to hotel sector buildings for continuous modernising and upgrading (Langdon & Everest, 2002). Çakmakli (2007) further pointed out that shutting of a hotel during refurbishment directly causes losses in revenue and the operation of the hotel simultaneous to refurbishment can cause disruptions to guests. Hotel sector is a major contributor to the income of most of the countries including Sri Lanka. In Sri Lanka, although the refurbishment projects in the hotel sector have been rising with development in tourism, these projects are characterised with challenges leading to undermining value for money (Athapattu & Gunawardena, 2010). In this context, VM can be applied to achieve value for money in hotel refurbishment projects in Sri Lanka.

1.2 Problem statement

Refurbishment of existing aging buildings is perceived as a strategic avenue to secure value for money mainly due to significant reduction in construction projects and also to cater technological changes, legislative reforms and sustainability issues concomitant to maintaining the value (Babangida et al., 2012). Nonetheless, according to Arain (2005), often refurbishment projects are characterised to be more time consuming and incurring high costs and the decision for refurbishment is made with an inadequate emphasis on the special nature of refurbishment. Chau et al. (2003) pointed out that there is lack of studies conducted to investigate the approaches to improve value for money in refurbishment projects, by overcoming the challenges.

Refurbishment plays a vital role in modernising and upgrading to hotel buildings (Langdon & Everest, 2002). However, refurbishments in the hotels directly affect revenue and the refurbishment parallel to operation of the hotel could cause disruptions to guests (Çakmakli, 2007). In Sri Lanka, the growth in refurbishment projects in the hotel sector is evident after the tsunami disaster and with the development in tourism (Athapattu & Gunawardena, 2010). Nevertheless, the authors pointed out that these projects are characterised with challenges leading to subvert value for money. In this

context, VM can be applied, since VM investigates and identifies the required function and then chooses the best option out of various alternatives to cater for client's best value requirement (Potts & Ankrah, 2013; Shen & Yu, 2016). Exploring the VM application is evident in Sri Lankan construction projects. Although VM can be employed to achieve value for money in hotel refurbishment projects, as per Bandara, Sandanayake and Ekanayake (2018) and Madushika, Perera, Eknayake and Shen (2018), VM is currently practised in Sri Lankan construction projects in an ad-hoc manner. Therefore, there is a need to enhance VM application, when it is employed in the hotel refurbishment projects in Sri Lanka.

1.3 Aim and Objectives

The aim of this research is to develop a framework to enhance the value management application in hotel refurbishment projects in Sri Lanka

In order to review this aim, following objectives have been formulated.

1. Conduct a situational analysis on
    a) challenges in hotel refurbishment projects in Sri Lanka
    b) value management application in hotel refurbishment projects in Sri Lanka
2. Investigate the challenges and existing solutions provided during the value management application in hotel refurbishment projects in Sri Lanka
3. Propose strategies for enhancing value management application in hotel refurbishment in Sri Lanka and benefits that can be obtained from successful application

1.4 Research Methodology

This research adopted a qualitative research approach to pursue the aim of this research, which is to develop a framework to enhance the value management application in hotel refurbishment projects in Sri Lanka. Initially, a background study was undertaken to investigate the research gap and formulate the research problem, aim and objectives. Subsequently, an extensive literature synthesis was undertaken to review the application of value management approach to construction projects with a special emphasis on refurbishment projects. This in depth review on literature was

undertaken by referring to sources such as books, journal articles, conference proceedings to name a few. This study adopted a case study approach, since the aim of this research mandated in depth investigation. Data collection was facilitated through three (03) major hotel building refurbishment projects. Hence, the unit of analysis was the hotel building refurbishment projects, which have employed value management during the refurbishment process.

Case studies were undertaken to investigate the challenges, current status of application of value management and challenges and solutions of applying value management in hotel refurbishment projects in Sri Lanka. Further, the strategies for enhancing value management application in hotel refurbishment projects in Sri Lanka and benefits that can be obtained from successful application were also investigated. Data was captured using semi structured interviews with the participants, who involved in the value management study in each case study project, documents review and observation of refurbished buildings. Data was analysed through code based content analysis technique using N-Vivo 12 software and the research findings were validated by interviewing three (03) subject matter experts. Based on the research findings, the framework for enhancing value management application in hotel refurbishment projects in Sri Lanka was developed. The research findings were mapped with the mainstream literature and finally conclusions and recommendations were provided.

1.5 Scope and Limitations

The scope of this research was limited to three (03) hotel building refurbishment projects in Sri Lanka, since refurbishment projects that have employed VM are comparatively high in hotel sector of Sri Lanka.

1.6 Chapter Breakdown

The structure of this research in chapters is discussed below.

Chapter 1 – Introduction

The research aim was formulated to enhance VM application in hotel refurbishment projects in Sri Lanka.

Chapter 2 – Literature Review

Presents a literature synthesis primarily focussing on the significance of refurbishment projects, benefits and challenges of refurbishment, value enhancement efforts in refurbishment projects, importance of value in the construction industry, the VM concept, applicability of VM to construction projects and applicability of VM in refurbishment projects.

Chapter 3 - Research methodology

This research adopted a qualitative approach and focused on case studies of three (03) refurbished hotel projects in Sri Lanka which have employed VM.

Chapter 4 –Data Collection, Analysis, Research Findings and Discussion

Presents the findings of the three (03) refurbished hotel projects, where VM has been exercised. Data was mainly gathered using semi structured interviews and documents review and analysed with code based content analysis using N-Vivo 12 software and manual content analysis. Current study established that VM is applied in an ad-hoc manner and introduced a framework for enhancing VM application in hotel refurbishment projects by incorporating strategies on raising awareness, training and development on VM, choosing the appropriate timeframe to apply VM, choosing the appropriate composition for the VM team, choosing the appropriate VM job plan and enabling legal provisions and assistance from regulatory bodies. Benefits of successful VM application were also presented.

Further, the research findings were compared with the existing literature by primarily focusing on areas such as building refurbishment projects, challenges in refurbishment projects, application of value management in refurbishment projects, challenges and solutions for value management application in refurbishment projects and enhancing

VM application in refurbishment projects. The discussion proves that the mainstream literature lacks rigorous findings on the application of VM in refurbishment projects.

Chapter 5 – Conclusions and Recommendations

Presents the overview and the conclusions of the study and describes the contribution of this research to body of knowledge. Primarily, it was concluded that currently VM is applied in an ad-hoc manner in refurbishment projects and it was recommended to adopt the developed framework to enhance the VM application. This chapter further discusses about the limitations of this study and further research areas too have been recommended.

The above chapter breakdown is presented in Figure 1.1.

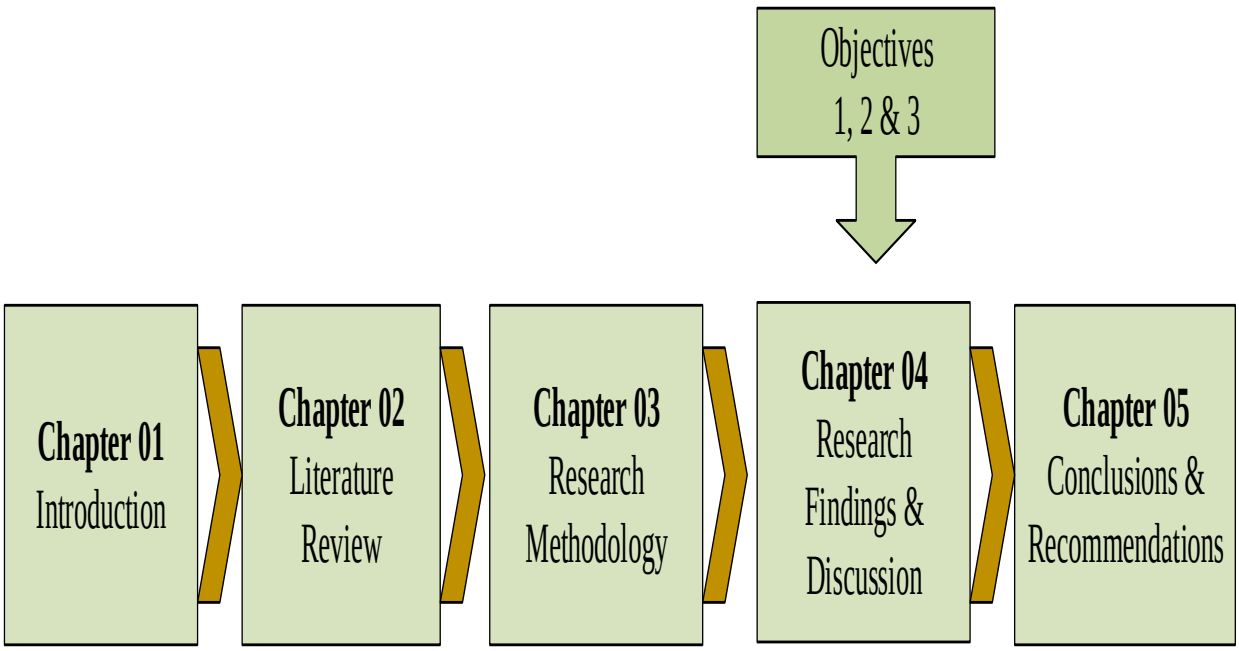


Figure 1.1: Chapter Breakdown

The figure further illustrates the contribution of chapters to achieve objectives.

1.7 Summary

The background study, research problem, aim and objectives, scope and limitations of the study are presented comprehensively. Moreover, the research methodology, which

was administered to achieve the aim and objectives of the research is discussed. The chapter breakdown of the research is discussed, illustrating the contribution of each chapter in achieving the objectives.

CHAPTER 02

2 LITERATURE REVIEW

2.1 Introduction

Findings of the literature review are presented in this chapter. The literature review primarily focuses on the significance of refurbishment projects, benefits and challenges of refurbishment, value enhancement efforts in refurbishment projects, importance of value in the construction industry, the VM concept, applicability of VM to construction projects and applicability of VM to refurbishment projects.

2.2 Refurbishment of Buildings

The building life cycle primarily constitutes construction, operation, maintenance and demolition (Chan, 2014). Further, the BS EN 15978 Standard (2011) elaborated the life cycle stages of a building as, the product stage, construction process, use, end of life and benefits and loads beyond the system boundary. These stages are illustrated in Figure 2.1.

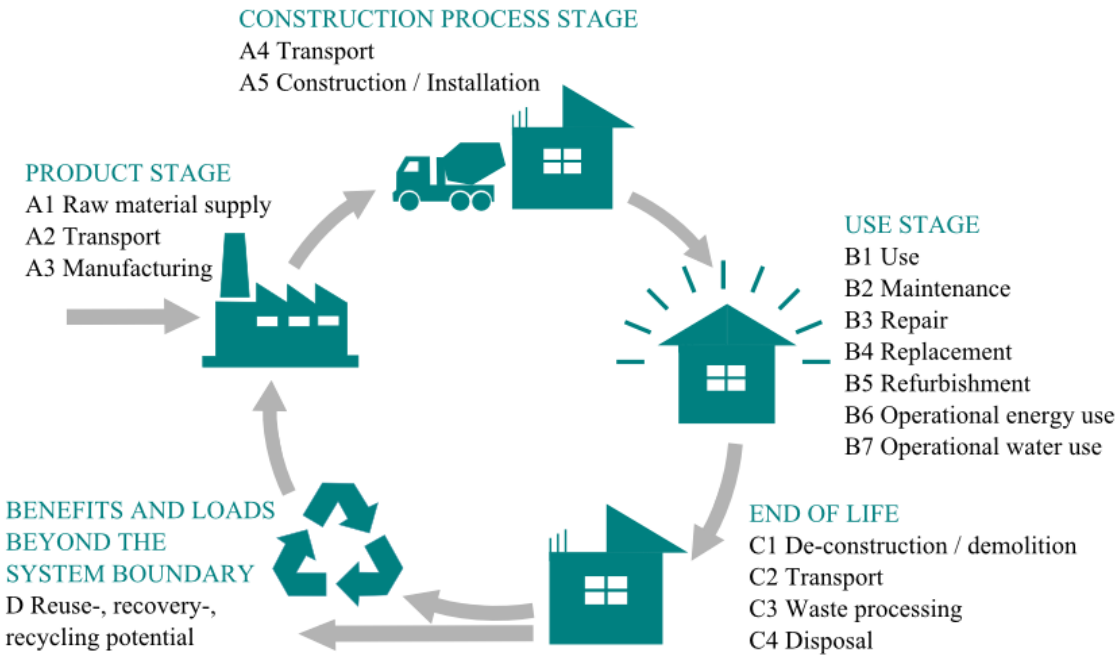


Figure 2.1: Life Cycle Stages of a Building

Source: (Chan, 2014)

As shown in Figure 2.1, refurbishment occurs at the use or the operation stage of the building life cycle.

2.2.1 Definitions of Refurbishment

It is evident from the past literature that the term "refurbishment" has been loosely defined. However, over the history, attempts have been made to provide (Mansfield, 2002).

Table 2.1: Definitions on Refurbishment

Definition	Source
Refurbishment involves, reconstruction, renovation, upgrading, renewal, restoration, conservation, rearrangement, alteration, conversion and expansion.	Construction Industry Research and Information Association [CIRIA] (1994)
Refurbishment includes retrofit, improvement, repair adaption, rehabilitation, upgrading, restoration, modernisation, conversion of existing buildings or ships but excludes cleaning, decorating and emergency maintenance work	Egbu, Young, and Torrance (1998)
Refurbishment encompasses rehabilitation, renovation, restoration, improvement, adaptation, upgrading and unplanned maintenance in buildings and is an important area of construction work, which is associated with demolition and de-construction activities	Egbu *et al*. (2002)
Refurbishment as a physical process, in which the boundaries between repair, replacement and renewal have not been precisely distinguished.	Mansfield (2002)
Refurbishment involves upgrading, alteration, extension and renovation of existing buildings for improving facilities and prolonging building lifespan	Rahmat and Ali (2010)

Regardless of the attempts undertaken to define the term refurbishment, Vilches, *et al*. (2017) pointed out that alternative terminologies such as refurbishment, retrofitting, renovation, repair or restoration are still being used interchangeably. Therefore, as derived from the aforementioned descriptions for refurbishment, it can be stated that refurbishment is a broad term, which encompasses following constituents:

- Renovation
- Retrofitting
- Repairing
- Restoration
- Replacement
- Rehabilitation
- Renewal
- Reconstruction
- Rearrangement
- Alteration
- Upgrading
- Conversion
- Expansion and extension
- Modernising
- Remodeling

The absolute physical boundaries of these constituents cannot be determined (Mansfield, 2002). Vainio (2011) pointed out that, 'renewal' refer renewing of the entire building or certain elements and 'modernisation', 'rehabilitation', 'retrofit or refit', 'refresh', 'upgrading' attributed to significant improvement of quality of the object. The author further claimed that 'restoration' is involved in preserving the architectural, cultural or historical value of the object. Overall, it can be stated that refurbishment is a broadly used term to describe construction activities that aim to raise the standard of a building (Ali, Rahmat & Hassan, 2008).

2.2.2 New Construction Projects vs Refurbishment Projects

Renovation and maintenance of existing structures are critical because approximately 50% of the total construction output accounts for them although more attention has been focused on new construction projects (Lawrence & Werna, 2009). Therefore, building refurbishment represents a significant percentage of turnover in the construction sector (Pereira & Cachadinha, 2011). On the other hand, the refurbishment measures signify the starting point of the building's second life (Rasmussen and Birgisdottir, 2016). Although refurbishment sector is important to many construction firms, it is not their sole concern (Rahmat & Ali, 2010). As a result, some designers and contractors tend to give a less focus to refurbishment work compared to new builds (CIRIA Report, 1994). New building projects allow a certain level of standardisation and choice of materials, equipment and technical solutions to be utilised, whereas the refurbishment projects must adapt to the uniqueness of the existing buildings and adjust to their specifics (Pereira & Cachadinha, 2011). Parameters such as location, orientation and existing construction cannot be altered in existing buildings. (Konstantinou & Knaack, 2013). As per Babangida (2014), refurbishment necessitates more responsiveness from managers and other professionals on management for a new build. In this context, refurbishment, which occurs during the operation and maintenance stage of the building life cycle are different from new building construction projects, because the refurbishment is carried out to a readily occupied building by adapting to the existing conditions.

2.2.3 Reasons for Undertaking Refurbishment

Refurbishment becomes an alternative, when the building in use fails to perform as expected (Ali, Kamaruzzaman & Salleh, 2009). Growth of the aging building stock has also induced an escalated demand for refurbishment projects in upcoming years (Kohler & Hassler, 2002). Specifically, refurbishment proposes solutions to deterioration and obsolescence in buildings (Mansfield, 2009). This refurbishment decision is affected by numerous parameters required by different parties to the project (Konstantinou & Knaack, 2013), because various reasons for undertaking refurbishment projects have a different degree of importance to interested parties (Aikivuori, 1996). The author further stated that, the owner expects the refurbished building as an investment, the users pay attention on the operation of the building, and the society anticipates welfare and environmental friendliness of the building. Arain (2005) summarised the types of refurbishment and reasons for refurbishment as follows:

- Corrective refurbishment - Failure in buildings
- Space altering refurbishment - Change in use
- Optimising refurbishment- Optimisation of economic factors
- Pleasure refurbishment – Subjectiveness of the building owners
- Opportunity refurbishment - Change of circumstances

Growing importance of refurbishment projects has necessitated more knowledge gaining and understanding in managing them (Ali, Rahmat & Hassan, 2008).

2.2.4 Timeframe to Undertake Refurbishment

During the time span of the building life cycle, refurbishment strategy is an important topical in facilities management agenda, because if the completed building facilities are not maintained properly, they deter delivering the intended performance (Chan, 2014). The author further asserted that building facilities must be maintained to an acceptable condition and must be refurbished to sustain its utilities and value. As per Babangida (2014), buildings are deteriorated over time while encountering different types of obsolescence. Hence, determining when refurbishment should be undertaken

is of utmost importance as shown in Figure 2.2 in which the building performance is plot against the time span of the building.

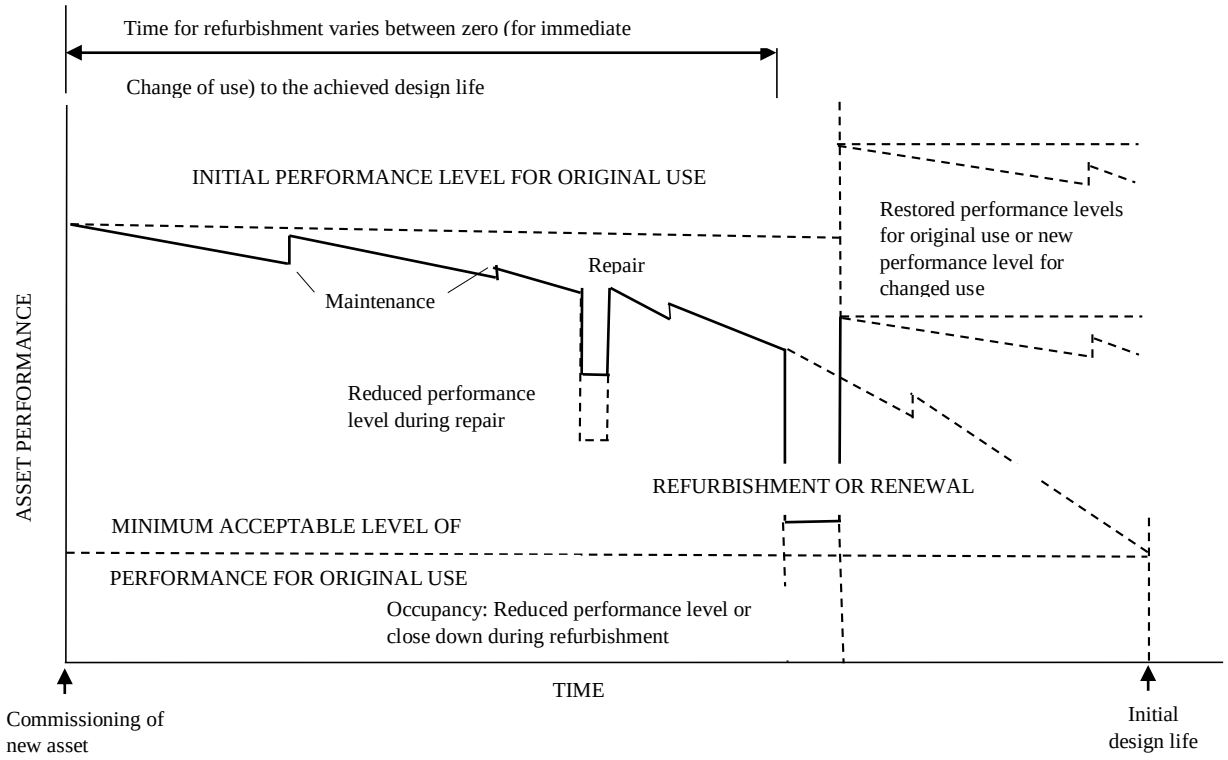


Figure 2.2: Timeframe for Refurbishment

Source: (CIRIA Report, 1994)

Figure 2.2 illustrates that typical deterioration in the performance of a building occurs with the passage of time (CIRIA Report, 1994). According to this graph, deterioration can be reduced by routine maintenance although repairs should be carried out from time to time and there will be a need for a major refurbishment, during which performance is likely to be further reduced.

2.2.5 Phases of a Refurbishment Project

The mainstream literature does not provide any systematic guideline on the stages of a refurbishment project. Although the standardisation of the life-cycle assessment methods in the construction sector are gaining popularity, neglecting certain life-cycle stages, particularly for building refurbishment projects is evident (Oregi, 2016). According to the author, this is mainly due to absence of information and unpredictable

future scenarios in a refurbishment project, compared to the whole life-cycle of the building.

CIRIA Report (1994) has attempted to formulate main stages of refurbishment project as follows:

1. Project identification stage, where preliminary estimate is done
2. Project appraisal stage, where the feasibility study is done
3. Project definition stage, where the conceptual design is developed
4. Detailed design stage, where the design is developed with the authorisation of the client
5. Implementation stage, where procurement and constructions are conducted
6. Operation stage, where commissioning is undertaken

In their study to identify the involvement of architect in the refurbishment process, Ali, Kamaruzzaman and Salleh (2009) identified inception, schematic design, detailed design, submission of drawings for approval, preparation of contract and implementation on site as the phases of a refurbishment project. The RIBA Plan of Work 2013 organises the process of building projects into eight (08) stages. However, the RIBA plan of work is more suitable as a guideline for new building construction projects, because of the un-matching patterns in refurbishment and new builds (Ali, Rahmat & Hassan, 2008).

Table 2.2: Stages of a Refurbishment Project

Source	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8
CIRIA Report (1994)	Project Identification Stage	Project Appraisal Stage	Project Definition Stage	Detailed Design Stage	Implementation Stage	Operation Stage		
Ali, Kamaruzzaman and Salleh (2009)	Inception	Schematic Design	Detailed Design	Submission of Drawings	Preparation of Contract	Implementation On Site		
RIBA Plan of Work 2013	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design Stage	Construction Stage	Handover and Close Out	In Use

Based on the foregoing review of stages of refurbishment projects, the current research considered following key stages for a refurbishment project

1. Stage 1- Project identification and appraisal stage
2. Stage 2- Concept design stage
3. Stage 3- Developed design stage
4. Stage 4- Tendering and contracting
5. Stage 5- Deconstruction and construction
6. Stage 6- Handover stage

Many stakeholders get involved in the project during each of the key stages.

2.2.6 Composition of the Refurbishment Project Team

The significance of refurbishment projects is highlighted with the engagement of many parties from the architect to the constructor and from the end-user to the real estate company (Lund et al., 2016). According to Fawcett and Palmer (2004), the refurbishment project team could comprise of client, occupants, design team, consultant, legal experts and insurance specialists. Generally, the composition of the refurbishment team can be described as follows (CIRIA, 1994, 2004).

- The client- Decision makers, who initiate and direct the project
- Occupants- Building users
- The design team- Specialist consultants, architects, quantity surveyors and engineers

Ali and Rahmat (2009) mentioned that seven (07) participants, who involve in design stage of refurbishment project. However, there can be many variations in the composition of the refurbishment project team depending on the project. Evidently, the procurement method used also determines the participants and their role (Ratnasabapathy & Rameezdeen, 2007). Selecting the appropriate procurement method for the refurbishment project is an important aspect in managing refurbishment projects with the proper coordination among the project participants (Ali, Peng, & Ling, 2014).

2.2.7 Benefits of Refurbishment Projects

The benefits yielded through refurbishment projects have been extensively discussed by many researchers. Amongst them, Power (2010) asserted that refurbishment offers comparatively higher benefits compared to new constructions and demolitions. The

key benefits of refurbishment projects, which are presented through mainstream literature are illustrated in Table 2.3.

Table 2.3: Benefits of Refurbishment Projects

Benefits	A	B	C	D	E	F	G	H	I	J
Increasing environmental friendliness	✓	✓		✓		✓	✓		✓	
Reducing emissions	✓	✓				✓	✓	✓	✓	
Increasing energy efficiency of the building		✓	✓	✓		✓	✓			
Reducing operational and maintenance costs		✓		✓	✓					✓
Reduced construction time, compared to new constructions		✓	✓	✓		✓				
Modernising and upgrading buildings			✓			✓	✓			
Improving building value		✓		✓	✓					
Delivering health and wellbeing to occupants		✓				✓	✓			
Increased use of recycled and reusable materials				✓	✓					✓
Effective use of land by retaining building stock				✓	✓					
Increasing resource efficiency	✓	✓								
Reduced site works				✓	✓					
Improving noise insulation						✓	✓			
Improving user comfort						✓	✓			
Prolonging building life span		✓		✓						
Reducing construction and demolition waste		✓							✓	
Delivering high returns on rental		✓								
Improving productivity of work environment		✓								

A-(Balaras, Dascalaki, & Kontoyiannidis, 2004); B- (Chan, 2014); C- (Gohardani & Björk, 2012); D- (Hardie, Miller and Khan, 2011); E-(Mansfield, 2009); F- (Mansfield, 2017); G- (Mickaityte, Zavadskas, Kaklauskas & Tupenaite, 2008); H- (Power, 2008); I- (Power, 2010); J- (Sodagar, 2013)

The mainstream literature show that the benefits yielded from refurbishment projects are mainly focused on environmental sustainability aspects.

2.2.8 Challenges of Refurbishment Projects

Refurbishment projects are associated with numerous challenges and building owners should evaluate them (Lund, Haddadi, Lohne, & Bjørberg, 2016).

Table 2.4: Challenges of Refurbishment Projects

Challenges	Sources															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
Introducing changes to existing structure is limited	✓	✓	✓	✓	✓				✓		✓					
Insufficient design information with the unavailability of original drawings and construction details		✓	✓	✓			✓					✓		✓		
Unanticipated cost overruns and financial constraints		✓						✓		✓	✓				✓	
Unanticipated time overruns		✓			✓	✓					✓				✓	
Simultaneous operations conducted by owner constraint the full possession of the building by contractor		✓	✓		✓					✓						
The complexity and uncertainty of work parcels is high		✓				✓		✓				✓				
Lack of information on requirements of the client				✓						✓	✓					
Lack of precise definition on its beginning, end and entire scope			✓	✓								✓				
Unsafe working conditions			✓		✓							✓				
Lack of proper communication and coordination between the project team					✓	✓	✓									
Lack of specialised knowledge and multidisciplinary skills from the project team						✓	✓			✓						
Existing building may subject to legislative constraints			✓		✓										✓	
Selecting the contract type and right procurement route		✓	✓													
Lack of quality standards and parameters											✓	✓				
Lack of decision making tools at early stages												✓			✓	
Absence of a proper site survey to investigate existing conditions of the building			✓									✓				

Challenges	Sources														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Lack of suitable materials to match the existing conditions of the building			✓				✓								
Potential future uses may remain uncertain			✓									✓			
Accumulation of salvaged materials through demolition waste													✓		
Compared to new buildings, ongoing maintenance costs can be higher												✓			
Existing undamaged materials may subject to degradation over time			✓												
May not match with the environmental performance of new buildings												✓			
The impact of noise, vibration, fumes and dirt					✓										
Lack of space for material storage			✓												

A- (Ali & Au-Yong, 2013); B- (Arain, 2005); C- (Babangida, 2014); D-(Bryde & Schulmeister,2012); E- (CIRIA, 1994); F-(Egbu et al., 2002); G-(Jensen & Maslesa, 2015); H-(Juan, 2009); I-(Konstantinou & Knack,2011); J-(Lee, 2015); K-(Lund, Haddadi, Lohne, & Bjørberg, 2016). L-(Mansfield, 2009); M- (Rahmat et al., 1998); N- (Rahmat & Ali, 2010); O-(Sodgar, 2013)

Among the top most challenges, limitations to introduce changes to existing structure, insufficient design information due to the unavailability of original drawings and construction details, unanticipated cost overruns and financial constraints and unanticipated time overruns are crucial. Overall, the challenges appear to be caused mainly due to the building and the project team.

2.3 Value Enhancement Efforts in Refurbishment Projects

Although the degree of complexity and uncertainties are higher in refurbishment projects due to the challenges associated with them compared to new building construction projects (Kemmer & Koskela, 2012), refurbishment projects are deemed to enhance the market value of aged buildings by restoring and improving building conditions physically and economically (Kaklauskas, Tupėnaitė, & Kanapeckienė, 2008). Therefore, building owners are tempted to invest in refurbishment projects to enhance the value of their properties (Yau, Chau, Ho & Wong, 2008). Continuous value enhancement is required to reduce missed opportunities, strengthen integration and enhance sustainability in building projects (Pulaski & Horman, 2005). When building refurbishment projects are investigated, Chau et al. (2003) contended that there seems a lack of empirical evidence on the approaches to enhance the value performance of refurbishment projects for achieving value for money by overpowering the challenges. Nevertheless, there is a need to understand the value, the composition and the long-term dynamic of buildings (Kohler & Hassler, 2002).

2.4 The Concept of Value

Value is subjective and thus, it is interpreted through different terminologies such as preference, attitude, desire, belief, need and criteria (Leung & Liu, 2003). As a result, constituents of value and methods of value creation still remain unclear (Ngo & O'Cass, 2010). Various interpretations on value are presented in Table 2.5.

Table 2.5: Interpretations on Value

Value Equation	Interpretation	Sources
Value = Function/Cost	Value is considered as the fundamental relationship between function and cost	(Hamilton, 2002; SAVE, 2017; Younker, 2003)
Value = (Function Quality)/Cost	Value is the least cost to achieve a function or a service while maintaining the desirable quality and performance. Function is the work that an item must perform while quality is the client's desired requirement and cost is the life cycle cost of the product	(Chhabra & Tripathi, 2014; Perera et al., 2003)
$\textbf{Value} \propto \frac{\textbf{Benefits delivered}}{\textbf{Resources used}}$	Value can be determined as how different needs are fulfilled by using or sacrificing resources	(BS 12973:2000; Dallas, 2008).

Different stakeholders of construction projects perceive value from their own perspective (Haddadi, Johansen, & Andersen, 2016). The authors further highlighted that value maximization of a construction project is one of the key objectives in project management

2.5 Value in Construction Projects

According to Emmitt, Sander and Christoffersen (2005); Martinsuo and Killen (2014), achieving value is the outcome of a construction project and hence, agreement on value for money parameters is necessitated. As a result, creating value for money is becoming vital (Gillier, Hooge, & Piat, 2015). Accordingly, construction organisations are tempted to employ different logics to create value with different cost and value drivers (Bygballe & Jahre, 2009). However, the value, price and costs have proven to be unpredictable over the project life cycle, resulting criticism on value delivering performance of construction industry (Ridder & Vrijhoef, 2004). The client, who is responsible for adopting the construction project for the mainstream business, implies and expresses the establishment of a value system for the project (Kelly et al., 2004). In any construction project elements, which contribute to the poor value are evident

(Norton & McElligott, 1995). The authors further listed that overcoming below mentioned elements provides an opportunity to enhance value for money:

- Inadequate time for the project
- Lack of expertise
- Lack of necessary information
- Unnecessarily restrictive design criteria
- Outdated standards and specifications
- Poor communication and coordination among project team members
- Prejudicial thinking

Management of value in construction projects can achieve project completions within stipulated time, anticipated cost and expected level of quality (Bowan, Cattell, Edwards, & Jay, 2010). Moreover, when value is concerned, the trade-off between cost, quality and time is evident (CIRIA, 2004) and also value is described as the level of significance placed upon a function or an item (Potts & Ankrah, 2013, p. 104).

2.6 Achieving Value for Money by Applying Value Management

Value management (VM) is widely acknowledged as vital to achieve value in the construction projects (Ellis, Wood, & Keel, 2005; Yu, Shen, Kelly & Lin, 2006). Karim (2016) pointed out that adoption of VM is not only regarding cost, because it considers the relationship among cost, function, value and quality with functional analysis as main components. The author further declared that VM achieves value for money by reducing cost, but does not compromise quality. Shen and Yu (2016) further confirmed this opinion by stating that VM is not pure cost reduction tool and it achieves optimum value at the lowest life cycle cost. As a result, VM is recognised as effective for achieving ‘‘best value-for-money’’ in construction industry (Shen & Liu, 2003). Naderpajouh and Afshar (2008) expressed that VM is different from others, since it is a systematic and multidisciplinary approach to analyse the functions of a project to improve the value which are listed as follows:

- Providing required project functions at a required cost
- Providing additional desirable project functions without adding to the cost
- Providing additional desirable project functions while reducing costs

When inventing the concept of VM, the focus on function could be regarded to stipulate enhanced value for money (Potts & Ankrah, 2013). In response to this opinion, the three main ways of enhancing value in construction projects by employing VM was invented (Ward, 2015). It is illustrated in Figure 2.3.

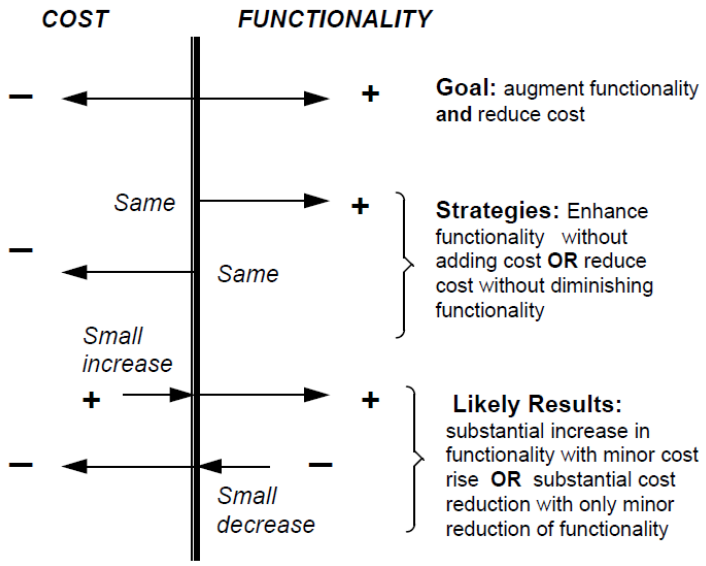


Figure 2.3: Compromise between Cost and Functionality

Source: (Ward, 2015)

As presented by Ward (2015), enhancing value is a compromise between cost and functionality.

2.7 The Concept of Value Management

Amongst the numerous definitions, VM is defined as "a structured and analytical process which seeks to achieve value for money by providing all necessary functions at the lowest cost consistent with the required levels of quality and performance" (AS/NZS 4183:1994). VM is also defined as "the total process of enhancing value for a client from a project from the phases of concept through to the operation and use" (Kelly et al., 2004, p 31). "VM is a proactive, problem solving or seeking service, which maximises the functional value of a project by managing its development from concept to use through structured, team-oriented exercises, which make explicit, and appraise subsequent decisions, by reference to the value requirements of the clients" (Abidin & Pasquire, 2007).

The prime idea behind VM, from these is that VM improves value for money by offering all necessary functions at the lowest life cycle cost.

2.7.1 Evolution of VM

The concept of VM has evolved from VA was developed by Lawrence Miles during World War II in order to determine solutions for alternative materials for manufacturing (Dallas, 2008; Liu & Shen, 2005; Shen & Liu, 2004). He introduced this method in 1940's while working at General Electric Company since the manufacturing industry in United States (US) was in the shortage of raw materials (Shen & Yu, 2012). As highlighted by the authors, Miles attempted to devise alternative solutions through VA to discover substitutes for raw materials, which deliver the same function at lower cost with better performance.

In 1954, the term VA was replaced by VE with its use in the US military and later in the construction industry of United Kingdom (UK) (Maznan, Jaapar, Bari & Zawawi, 2012). Possibility of applying VE to the construction industry was first proposed by Dell'Isola and since then VE has been widely accepted in the construction industry mandating its applicability for functional improvements (Shen & Yu, 2012). This is mainly due to the fact that construction industry in many countries is criticised for the inefficiencies such as cost and time overruns, low productivity, poor quality resulting customer's dissatisfaction (Chan, A, Chan, D & Ho, 2003). Currently, in the US, VM is also known by the term value methodology (Younker, 2003). Younker (2003) mentioned that the Society of American Value Engineers (SAVE) was formed as an organisation to strengthen the value methodology practice. The value methodology, which is alternatively referred to as VM, VE and VA is a systematic approach used for identifying and developing value and innovation to improve projects, products, and processes (SAVE, 2017). It is also mentioned that this approach is used to reduce costs, increase profits, improve quality, performance and enhance customer satisfaction. Although VM is used synonymously with VE and VA, VM is the widely accepted terminology to address other value methodologies, which are used to deliver best value for money (Perera et al., 2011; Shen & Liu, 2003). By investigating the evolution of VM, Dallas (2008) depicted the focus of VM over the history spanning from its inception to date as in Figure 2.4.

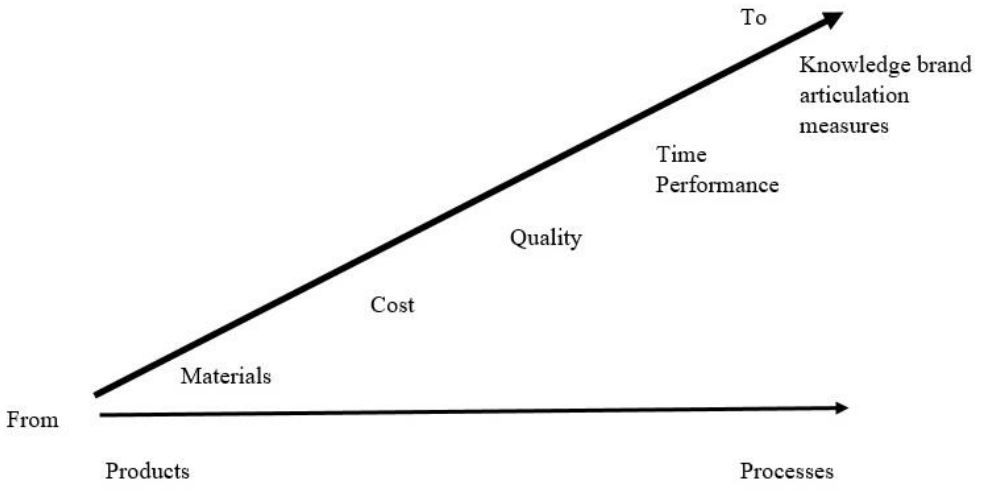


Figure 2.4: Evolution of VM

Source: (Dallas, 2008)

The initial emphasis on selecting material can be observed since VM was invented for the manufacturing industry, focussing on products. Then the focus was placed on cost reduction. Gradually the focus of VM was centred around quality with the growth of quality improvement approaches in the processes. Since the client's requirements needed to be fulfilled timely, the emphasis then was shifted to time aspect. Currently, the emphasis is on knowledge and brand articulation of a combined appreciation of value embracing cost, quality, time and performance of processes rather than products. The author further pointed out the shift in the focus of VM from products towards processes over the time span.

2.7.2 Different Terminologies Associated with VM

According to Male, Kelly, Fernie, Gronqvist and Bowles (as cited in Shen & Liu, 2004), although VM is distinguished from other terms such as VE and VA, it is considered as the term to describe the total value enhancing process from concept to operation. Moreover, VE and VA are special cases of the generic term of VM **(**Shen & Liu, 2004). In other words, VM is the broad term used to encompass the value techniques including VP, VE and VA or VR (Perera et al., 2003; Potts & Ankrah, 2013). Institution of Civil Engineers [ICE] (as cited in Potts & Ankrah, 2013) presented the application of VP, VE and VA in projects as illustrated in Figure 2.5.

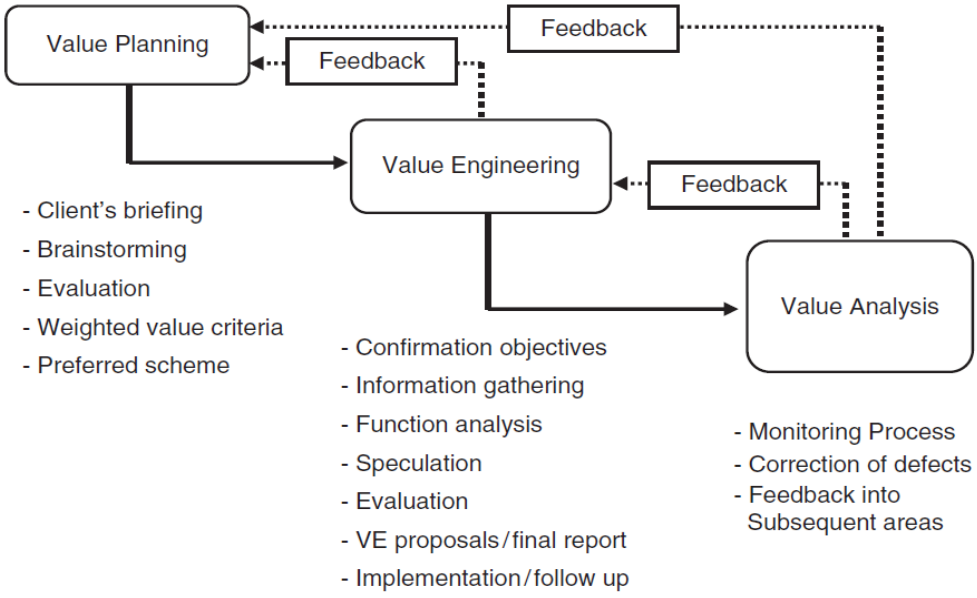


Figure 2.5: Different Terminologies Associated with VM

Source: Institution of Civil Engineers [ICE] (as cited in Potts & Ankrah, 2013)

VP is applied during the project concept phase to identify the value criteria and to warrant that value is planned into the project from its inception (Kelly et al., 2004; Potts & Ankrah, 2013). The authors further claimed that concept proposals aim to fulfil the client's requirements. Nawawi et al. (2015) contended that VP is a strategic plan undertaken before the executing the project. During the VP phase, several designs will be evaluated to select the option that best meets the functional and other requirements (Potts & Ankrah, 2013). According to ICE (as cited in Hamilton, 2000), even though VP is used interchangeably with VM, VP is employed at the inception and conceptual stages.

Kelly et al. (2004) emphasised that VE, which is subsumed as a component of VM is appropriate during the design and construction phases of the project. In the initial stages of the development of VE, it was used by production engineers for reducing the cost of manufacturing, until its applicability in the construction industry came in to light (Ilayaraja & Eqyaabal, 2015). Currently, the role of VE as a cost reduction technique in construction industry has become vital due to its innovative solutions

(Chhabra, & Tripathi, 2014). Moreover, VE is considered as a construction management tool to enhance procedures, services and final products catering client's requirements in terms of time, cost and quality (Ahmed & Pandey, 2013). During the project development, VE focusses to attain best value from a whole life perspective (Al-Yami & Price, 2005). However, in the construction industry, the terms VM and VE are in use parallely to describe a process of assessment of project functions to warrant effective delivery (Al-Yami & Price, 2005; Ilayaraja & Eqyaabal, 2015). Whilst VM focusses on the business project, which encompasses the strategic phase of the project with client's requirements, emphasis of VE is on the technical project through which the construction industry responses via technical solutions (Kelly et al., 2004). Compared to VM, VE offers the hard systems approach, in which the objective of cost reduction is dominated (Green, 1994). As demonstrated in Figure 2.6, VM is employed commencing from the project inception or early conceptual design stage and continued throughout the entire project life cycle, while VE is appropriate during the design and construction phases of the project.

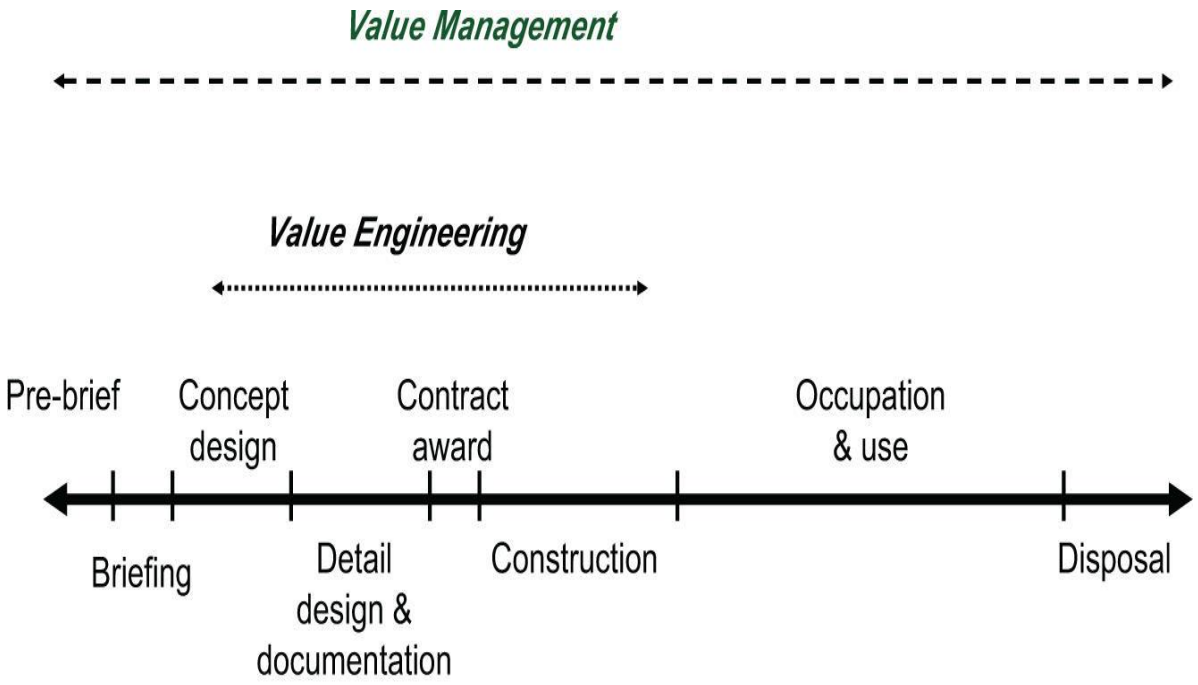


Figure 2.6: Value Management vs Value Engineering

Source: (Green & Liu, 2007)

VA is employed at any point in the project life cycle to measure the effectiveness of the value process (Kelly et al., 2004), in which the value manager is responsible to ensure that the value identified in the VP and VE are actually delivered (Potts & Ankrah, 2013, p.110). As per the above literature findings, it can be argued that VM is the holistic term which encompasses VP, VE and VA although these terminologies have been used interchangeably in the literature as well as in the practice.

2.7.3 Key Components of VM

The key components associated with a successful VM study are elaborated in the mainstream literature. As identified by Shen and Yu (2016), the five components of VM are the functional approach, functional cost approach, organised job plan, organised team approach and environment for creativity.

2.7.4 The VM Job Plan

VM approach offers a job plan to guide addressing issues throughout the life cycle of the project effectively (Jaapar, Maznan & Zawawi, 2012; Shen & Tu, 2012). This is generally recognised as the VE job plan, which varies from five to eight phases (Al-Yami & Price, 2005; Chhabra & Tripathi, 2014). It is also known as value study process, VM workshop or VM study (Kelly et al., 2004; Shen & Yu, 2016). There are several types of VM job plans as pointed out by Shen and Yu (2016) and they are tabulated in Table 2.6.

Table 2.6: Types of VM Job Plans

VM job plans	Nature of the VM job plans
Charrette Job Plan	Ensures that designers fully understand client's requirements and aims to rationalise the client's brief. This should be executed during the early design stage
SAVE 40-hour Job Plan	Most commonly accepted formal approach for VM study. Takes 5 days with at least 8 hours per day
Contractor's Change Proposal	The common form of delivering VM to a construction project, which is initiated by the contractor. It is initiated mostly during the post tender stage and cost savings due to VM are shared by the client and the contactor
Truncated Workshop	When the estimated project value is less than USD 2-3 million, 10% rule of thumb is applied to determine the amount to be spent on VM

Concurrent Study	With this approach, the design team have regular meetings under the supervision of the value engineer to assess the designs. In construction management contracts, the concurrent study is suitable because the design is carried out in phases simultaneously with the construction

Kelly et al. (2004) and Kelly and Male (1993) identified four (04) formal approaches to North American VE as the charrette, the SAVE 40-hour study, the VE audit and the contractors' change proposal. In addition to the key methods, Bowen et al. (2010) have indicated shortened study and orientation meeting, as VM job plans, despite their non-popularity in the construction industry. VM study is commonly carried out through a VM workshop (Ellis et al., 2005; Mat, 2014). According to the authors, the workshop usually follows a format similar to the standard methodology proposed by SAVE International, which is the SAVE 40-hour job plan. A VM workshop means, "a formal facilitated event, involving multiple stakeholders and disciplines, taking participants through a structured process to a prescribed outcome" (Office of Government Commerce [OGC], 2017). The standard SAVE 40-hour VM job plan is organised in following three (03) stages as pre-study stage/ pre workshop, value study stage/ VM workshop and post-study stage/ post workshop (Rad & Yamini, 2016; Shen & Yu, 2016) and it is summarised in Table 2.7.

Table 2.7: The Phases, Activities and Techniques of a VM Workshop

Phase	Activities	Techniques
Stage 01 Pre-Workshop/ Pre study Stage	• Understand project issues and limitations • Receive information prior to the VM workshop • Appoint VM team and VM facilitator • Determine the objectives and scope of the VM study • Ensure that VM team understands the VM process	• Brainstorming
Stage 02 Value study stage/ VM workshop stage		
Information Phase	• Produce an information base for the VM study • Collect all the facts, drawings, specifications and cost estimates • Understand previous issues • Determine the completeness of cost estimates • Prepare and gather answers to a value objectives questionnaire	• Presentations • Graphics • Cost, energy, area models • Pre- reading • Life cycle cost

Phase	Activities	Techniques
Function Analysis Phase	• Determine primary and secondary functions • Assign costs per function • Determine worth of function • Eliminate unnecessary functions • Combine functions if required	• Function Analysis • FAST diagrams • Function Hierarchy • Priority Matrix
Creativity Phase	• Determine alternatives for performing each of the functions selected for study • Brainstorming techniques used • List all ideas and use checklists • Locate where the function is performed	• Brainstorming • Golden technique • Synectics • Lateral thinking
Evaluation Phase	• Explore the ideas and concepts from the creativity phase • Develop most feasible ideas into tangible value improvements • Rank the alternative ideas • Select ideas for development and establish costs on all ideas • Develop function alternatives and evaluate by comparison	• Rating/ Weighting • Life cycle costs • Multi-disciplinary input • Group interaction • Corporate sense
Development Phase	• Select and further prepare the best alternative for the value improvement • Develop alternative functions • List advantages and disadvantages • Compare original with proposed methods • Include complete description of proposed methods	• Cogent report and executive summary • Clear action resolution
Presentation Phase	• Selected ideas are turned in to written recommendations to be implemented • Obtain agreement and commitment from involved parties • Compile technical data package for each proposed alternative • Proceed recommendations for implementation • Summarise all the recommendations in a final proposal by VM team for the approval of the decision makers	• Cost benefit analysis • Performance benefit analysis • Action plan and follow up
Stage 03- post-study stage/ post workshop	• Follow-up with action plan to ensure that the proposed methods are implemented • Audit the VM results to make improvement on future studies.	• Follow up reports

Source: (SAVE, 1998a; Shen & Yu, 2016).

The structured job plan assists in assessment and evaluation of value of product and procedures (Yan, 2012).

2.7.5 The Composition of VM Team

A multi-disciplinary team should be involved to carry out a successful value study (Sanvido and Konchar, 1999). The VM team has different compositions, depending on the internal or the external parties involved in it (Shen & Yu, 2016). The authors pointed out following composition for the VM team; project manager, client representative, design team, contractors, end users and VM facilitator. Shen and Liu (2003) identified client, VM facilitator, independent audit team and project design team as the VM team. It is evident that VM could be either conducted in house or outsourced or in combination of both. If the project has technical complications, obtaining second opinions can be facilitated by engaging an independent VM team (Ilayaraja & Eqyaabal, 2015). However, this could stain the relationship between the client and the design team (Shen & Liu, 2004). An external team might attempt to alter the current design and charge a high fee (Ilayaraja & Eqyaabal, 2015). Therefore, if a certified value specialist (CVS), VM expert or a VM facilitator is involved, he cannot be a "visiting expert" but he should be able to guide and encourage the team during the VM study. Nevertheless, solutions to the problems should not be proposed by him, and these should be suggested by the team members themselves (Green, 1991). Figure 2.7 elaborates the difference between the conventional approach of involving project stakeholders against the VM approach towards a project success.

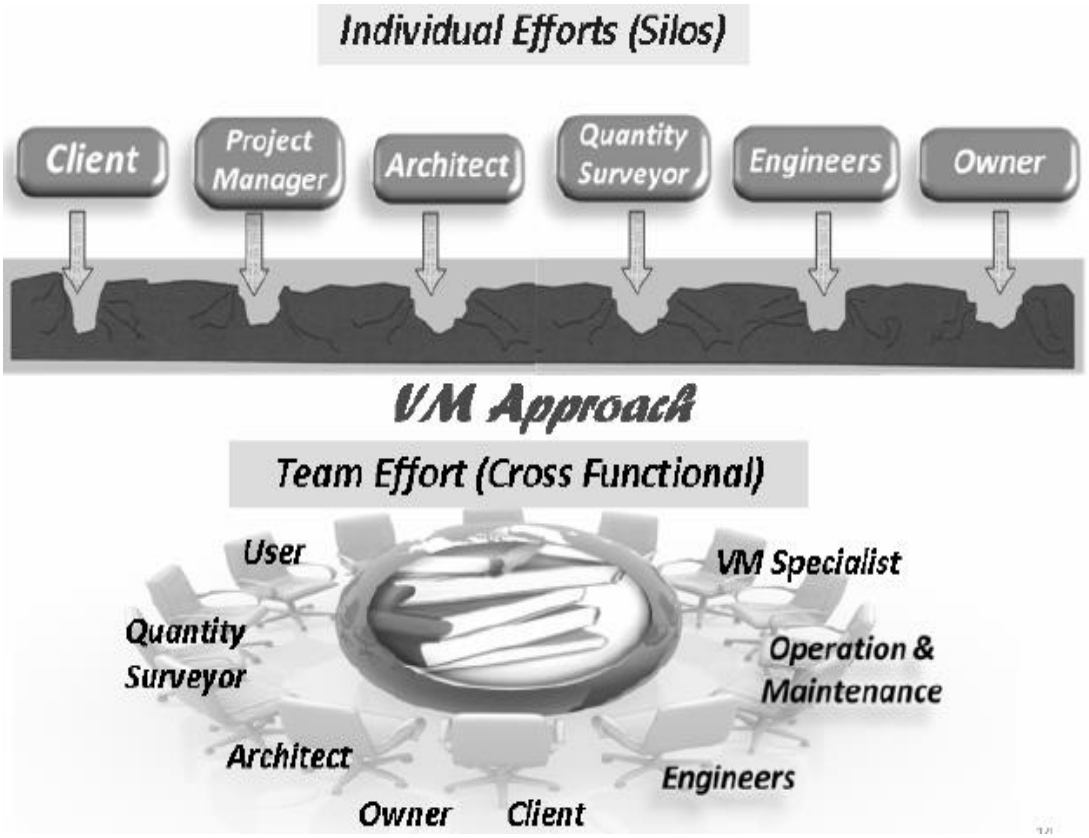


Figure 2.7: Conventional Approach vs VM Approach

Source: (Mat, 2014)

In the conventional approach, project stakeholders tend to work individually, while the VM approach encourages team effort, where everyone shall work cross functionally. Moreover, it can be argued that VM approach encourages integrated design process (IDP), which is a method of intervening during the early design stages to support the design team to avoid sub-optimal design solutions (Larsson, 2009). This VM approach is resonating with the recent trends in construction projects which applies IDP for realising high performance sustainable buildings, through a collaborative process which focuses on the design, construction, operation and occupancy of a building over the building life-cycle (Larsson, 2009; Whole Building Design Guide, 2016). Thus, the recent applications in sustainable concepts in construction projects necessitates collaborative, multi-disciplinary project teams as pointed out by the VM approach.

2.7.6 The Timeframe to Apply VM in a Construction Project

A Value study of a project can be conducted at any project stage, although earlier application generates higher acceptance of value proposals (Ilayaraja & Eqyaabal, 2015). Nevertheless, the industry practitioners suggest that prompt adoption of VM. Hence the author pointed out that despite the interest to incorporate VM to projects, the construction projects have numerous opinions on the most suitable timeframe to apply it.

As illustrated in Figure 2.9, since VM studies during latter project stages reveal high cost of application, less acceptance of VM proposals is possible. As per Kelly, Morledge and Wilkinson (2009), "VE opportunities commence at the stage when the project can be identified in terms of its elements and components" (p.78). Shen and Yu (2016) also confirmed that traditionally VM is used at the detailed design stage. Abdulaziz (as cited in Arabiyyat, 2016) determined three (03) different design stages where VE could be employed. Accordingly, the initially during the planning stage where functions and requirements of the project are established and secondly, when the design is at 15%-30%, commencing from detailed VE proposals and alternatives to the design are produced. Thirdly, is where the design has developed to 80%-85%.

As a whole, the past researchers have proposed to apply VM to construction projects at the initial stages. The impact on the cost of the project by applying VM in different stages of project is illustrated in Figure 2.8.

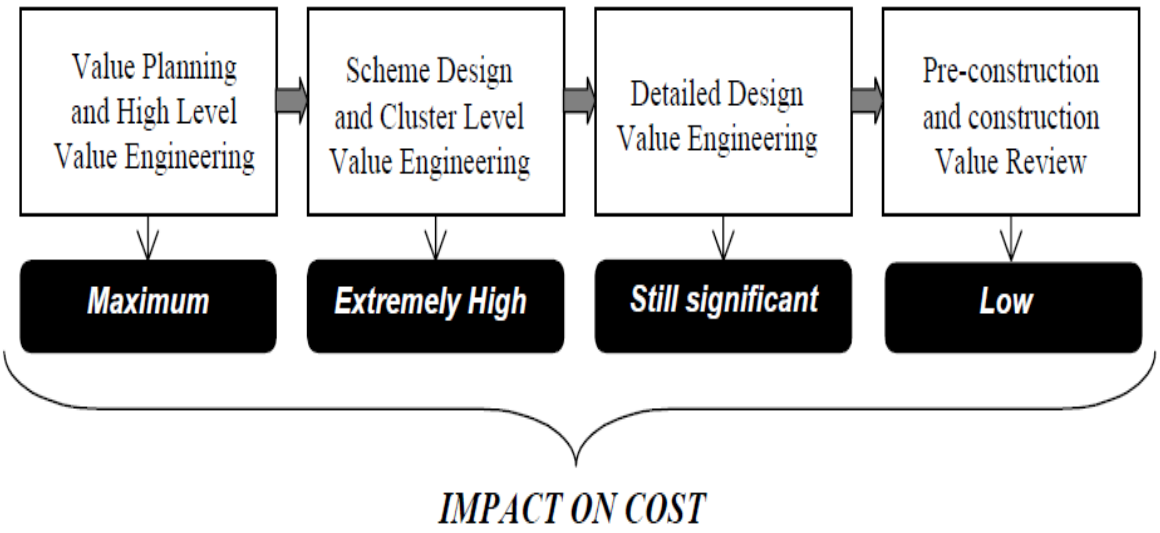


Figure 2.8: The Impact of VM Activities on Cost

Source: (Ward, 2015)

According to Ward (2015), the maximum benefit of applying VM for a project is accomplished during the scheme design stage and the benefit of applying VM.

2.7.7 The Impact of the Procurement Method on the VM Study

The selected procurement method has a direct impact to integrate VM to construction projects (Kelly and Male, 2003). The traditional procurement method prevents the client from employing the experience and knowledge of the contractor in areas such as material, labour, techniques and market conditions during the design stage (Sweet and Schneier, 2013), 2009).

2.7.8 Benefits of Employing VM in Construction Projects

The benefits offered by VM have been extensively discussed through many researches. Among these benefits, VM is considered as a useful method to conquer the challenges of budget and time constraints in construction projects (Lin & Shen, 2012). VM optimises the life cycle cost and enhances the value of a facility by identifying opportunities to remove unnecessary costs concomitant to assuring the quality, reliability, performance to cater customer's expectations (Dell'Isola, as cited in Shen & Liu, 2004). In addition to eliminating unnecessary costs, VM can integrate sustainability to projects (Shen & Yu, 2016). Rachwan et al. (2016) confirmed this by highlighting that the VE alternatives conducted on 700 luxurious residential units have

achieved 40% of cos savings and 55% improved thermal insulation function. A well-structured VM study can generate logical alternatives (Hunter & Kelly, 2004; Mousakhani, Yavarkhani, & Sohrabi, 2017) and creative avenues to deliver functionality in construction projects (Shen, Kelly, Sun, & Lin, 2004). Contributing to cross-functional processes and team performance is another notable outcome of a VM study (Dumond, 2000). Making the project participants tempted to use latest technology are among the intangible benefits of VM (Karunasena & Gamage, 2017).

2.7.9 Challenges of Employing VM in Construction Projects

Application of VM in construction projects have always been encountered with certain challenges. In general, Yu, Shen and Chung (2016) summarised these challenges in to three (03) categories as lack of information, lack of participation and difficulty in conducting evaluation. However, the mainstream literature on the VM application in construction projects of different countries prove that, depending on the context, these challenges could differ as illustrated in Table 2.8.

Table 2.8: Challenges of Employing VM

Challenges	Country							
	China	Ghana	Saudi Arabia	Nigeria	Hong Kong	Malaysia	Australia	South Asia
Lack of awareness about VM and its applications	E	F	B	A	E	E, D	J,C	E
Lack of practical guidelines on the VM application in construction projects	I							E
Lack of information such as specifications, standards, past data in construction projects			B					
Inadequate support, leadership and commitment from the top management			B					
Lack of time to implement VM while the projects are ongoing			B				C	G
Lack of government policy and legal assistance from regulatory bodies				A				G
Negative attitude and reluctance of client's towards VM				A			C	G

Lack of provisions for incentives in executing VM in the contract documents			
Inadequate experience of VM team members			H
Reluctance to change among the involved parties	D	J, C	H, G
The conflicting objectives of the project team members	D		G
Inadequate comprehension of VM tools and techniques			

(Aduze, 2014), B- (Al Yami, 2008), C- (Cheah & Ting, 2005), D- (Jaapur, Endut, Bari, & Takim, 2009), E (Kim et al., 2016), F- (Kissi, Boateng, & Kumi, 2015), G- (Latief & Kurniawan, 2009), H- (Malla, 2013), I-(Shen & Liu, 2004), J-(Whyte & Cammarano, 2012)

2.8 Applications of VM in Construction Industry

Numerous researches have been conducted to explore various applications of VM in construction industry in different countries. Based on the suggestion of Dell'Isola, the construction industry initiated applying VE in construction projects (Shen & Yu, 2012). However, in 1980s, the construction industry of UK changed the terminology from VE to VM to address the holistic perspective (Kelly & Male, 1992; Kelly et al., 2014). It is observed that VM and VE are alternatively used in construction projects with the purpose of value enhancing (Al-Yami & Price, 2005; Ilayaraja & Eqyaabal, 2015). Conversely, in the construction industry of US, VM is known by the term value methodology (SAVE, 2017).

Perera et al. (2003) pointed out that successful application of VM techniques in all types of construction projects ranging from buildings to offshore oil and gas platforms is observant. The authors further attempted to explore the usability of VM principles and procedures and assess the effective application of VM in the construction industry in Northern Ireland. Since VM has offered significant benefits in capital projects in some developed and developing countries, embracement of VM in the construction projects in Nigeria is gaining attention (Aghimien & Oke, 2015). Hamedani, Hajian, Bemanian, Safavi and Parhizkar (2015) asserted that employing VE technique in project management contributes to enhance value index of urban projects. In Malaysia, it has been implemented in public projects as well as private projects (Jaapar, Maznan & Zawawi, 2012; Maznan, Jaapar, Bari, & Zawawi, 2012). Moreover, Fathoni, Zakaria and Rohayu (2013) presented the findings that application of life cycle costing and VE in Malaysian construction industry is still at a low level. VM encounters many

challenges when applied in the construction industry of Vietnam and in many other developing countries (Kim, Lee, Viet Thanh & Luu -Truong, 2016). Although certain successful applications of VM in China's construction industry are evident, many actions should be taken to exploit full benefits of delivering value for money (Liu & Shen, 2005; Shen and Liu, 2004). In addition, Berawi et al. (2014) utilised VE in two (02) mega infrastructure projects in Indonesia to enhance value for money. Ahmed and Pandey (2013) clarified the concept of VM in the construction industry through a literature review and explored the use of VE through a historical review of VE applications in the USA, Europe and Japan.

Yu and Shen (2005) introduced a theoretical foundation and described the process for the developing of VM framework for project briefing. Further to that, Yu, Shen, Kelly and Lin (2006) presented a methodology that employs VM approach in the project briefing process. Leung and Liu (2003) further developed a cognitive VM model for construction procurement to examine the impact of previous project outcomes on value and also to identify other factors, which affect project goals and conflict resolution in the VM process. Shen and Liu (2003) identified and ranked critical success factors of VM studies in construction projects. Lin and Shen (2006, 2007) developed a performance measurement framework for VM studies in the construction industry. With the surge interest for employing VM in construction productions, some researchers have proposed approaches for assisting construction industry professionals for effective implementation of VM. Amongst such inventions, adoption of group decision support system for VM studies in the construction industry has proven to be a powerful tool in promoting interaction and facilitating decision analysis in VM studies (Shen & Chung, 2002).

Initially, a very few instances of VM application can be found in the construction industry of Sri Lanka, mainly as a result of fragmentation of the industry (Perera et al., 2003). The authors further pointed out that VM was employed in the "World Trade Center". With respect to the legal provisions in Sri Lanka, Clause 13.2 of the Standard Bidding Document (SBD) for procurements of Works – Major Contracts (2007) as well as the SBD for procurements of Works – Design and Build Contracts (2003) state that "the Contractor may, at any time, submit to the Engineer a written proposal which

(in the contractor's opinion) will, if adopted, (a) accelerate completion; (b) reduce the cost to the Employer of executing, maintaining or operating the Works; (c) improve the efficiency or value to the Employer of the completed Works; or (d) otherwise be of benefits to the Employer" (ICTAD, 2007, p.75). ICTAD (2007) states that the "Engineer shall agree to a fee shall be half (50%) of the difference between the (i) and (ii) given below, (i.e., if (i)> (ii)):"

(i) "Reduction in the contract value, resulting from the change approved"

(ii) "Any reduction in the value of the varied works due to reduction in quality, expected life, or operational efficiency"

There is no such gain sharing percentage specified in SBD for procurements of Works – Design and Build Contracts (2003); however, the "Engineer shall agree to determine adjustments to the contract price (according to sub clause 3.4 - Determinations), including a reasonable profit taking account of the value engineering proposal of the contractor" (ICTAD, 2003). There has been a drastic interest in exploring the applications of VM and VE in the Sri Lankan construction industry context. A decision-making formula for VE applications in the Sri Lankan construction industry was introduced by Karunasena and Gamage (2017). Bandara et al. (2018) explored the application of VE in MEP projects. Further to that Madushika et al. (2018) developed key performance indicators of VM in the Sri Lankan construction industry. Bandara et al. (2018) and Madushika et al. (2018) revealed that VM is practised in an ad-hoc manner in Sri Lankan construction projects.

2.9 Application of VM in Refurbishment Projects

The construction industry has been applying VM for more than half a decade with the aim of elevating construction project value (Zhang et al., 2009). However, studies of value theory can be conducted in any stage of the project, from emergence to development and even after the operation (Ilayaraja & Eqyaabal, 2015; Chougule and Patil, 2014).

The study of Witschey and Wulff (1998) on the application of VE in the renovation project of the Science Museum of Virginia in 1997 is one of the few examples. In this case study, the purpose of applying VE was to achieve capital cost savings without

compromising the quality. The VE study was led by the main contractor, who was a CVS was contracted by the client to employ VE on the project preliminary design, using the VE process resulting from the SAVE 40-hour job plan. The VE process conducted by the VE team comprised of selection phase, information phase, creative phase, evaluation phase, development phase, recommendation and approval phase, implementation phase and audit phase. The total cost saving achieved from the VE proposals which were implemented as alternatives to the initial proposals was about USD 1,287,549.00. Although the authors have not specified the specific VE team composition, two members representing the same party had not involved. Since it was a renovation project, the facility manager was also involved in the VE study. Alan Short, Barrett, Dye and Sutrisna (2007) studied the application of VE in five capital arts projects in the United Kingdom, which involved refurbishment as well as partial new constructions and the research was conducted while the projects were on going. The consultants and contractors collaboratively initiated VE during the early design stage to reduce budget overruns. Due to redesigning, VE was also employed during the construction stage and as a result, it had an impact on the schedule of the project. There was no evidence on VM workshop or a standardised VM process.

None of the projects have realised the terminology, "value management", because the emphasis of VE is on generating technical solutions (Kelly et al., 2004) and compared to VM, VE is accompanied with the objective of cost reduction (Green, 1994). Both these studies prove that VM was applied in an ad-hoc manner in the refurbishment projects. Hence, it is evident that despite the various application and approaches of VM in construction projects, lack of studies on the enhancement of VM application in building refurbishment projects is observant.

2.10 Application of VM in Hotel Refurbishment Projects in Sri Lanka

Compared to other types of building refurbishment projects, refurbishment is vital to hotel buildings in order to uplift building conditions to remain competitive to attract guests (Langdon & Everest, 2002). The authors further opined that these projects are associated with challenges prevailed in the existing building and the unanticipated cost and time overruns during the project. Çakmakli (2007) pointed out two (02) major concerns related to hotel refurbishment projects, i.e, shutting down of a hotel during

refurbishment directly causes losses in revenue and the operation of the hotel simultaneous to refurbishment can cause disruptions to guests. Although the refurbishment projects in the hotel sector of Sri Lanka have been rising after the tsunami disaster and also with the growth of tourism, these projects are characterised with challenges leading to subvert value for money (Athapattu & Gunawardena, 2010).

Although VM can be employed to achieve value for money in hotel refurbishment projects, given the importance and uniqueness of the hotel building refurbishments and the challenges associated with them, there is a lack of investigation to enhance VM application in hotel refurbishment projects in Sri Lanka. The findings of this literature review was used for the subsequent empirical study.

2.11 Summary

Refurbishment plays a vital role in improving existing buildings by conquering many contemporary issues. Nonetheless, the challenges associated with refurbishment projects make them more complicated and uncertain. These challenges lead to subvert value for money in refurbishment projects and there is a little focus given on to the approaches to enhance the value performance of building refurbishment. VM is renowned for enhancing the value throughout any stage of a construction project, in order to deliver value for money. Reviewing the application of VM to construction projects with a special emphasis on refurbishment projects was the prime focus of the literature synthesis. It was found that there seems a lack of investigation to enhance VM application in building refurbishment projects. Since the refurbishment projects in hotel buildings of Sri Lanka have been rising, the need to enhance VM application in hotel refurbishment projects in Sri Lanka was emphasised through the literature findings.

CHAPTER 03

3 RESEARCH METHODOLOGY

3.1 Introduction

Research is known as the scientific investigation, which determines the solution to a specific problem (Naoum, 2013). In any research, it is the research methodology that embodies the steps from the devising of the research problem to the deriving of the conclusion (Tan, 2018).

3.2 Research Design

According to Saunders, Lewis and Thornhill (2009), the research design entails the plan to determine the answer to the research problem through research strategies and specifies data collection sources. Therefore, an appropriate research design ensures that the evidence collected, permits the researcher to discover the answer to the research problem (de Vaus, 2001).

3.3 Research Approach

The approaches to the research problem are comprised of own set of strengths and weaknesses (Abowitz & Toole, 2010). However, the mixed research approach is used to counteract the weaknesses of those, because sometimes the use of a single research approach may not be effective (Amaratunga, Baldry, Sarshar & Newton, 2002).

3.3.1 Quantitative Approach

Quantitative approach is based on statistics and focussed on numerical data (Saunders et al., 2009). The quantitative approach enables measuring data collected from numerous sources and testing through statistical means to generalise the findings (Walsh, 2003). Nevertheless, the author further pointed out that the research findings derived from quantitative research are often criticised for lack of elaboration of underlying reasons for producing such results.

3.3.2 Qualitative Approach

Qualitative approach is used to capture in depth opinions and understanding of the respondents by exploring their experience, attitudes and behaviour (Dawson, 2007). As defined by Creswell (2013), “qualitative approach is an approach for exploring and

understanding the meaning, individuals or groups ascribe to a social or human problem". Lack of generalisability of research findings is a constraint encountered in a qualitative approach (Atieno, 2009). However, Dawson (2007) claimed that generalisation of findings is not intended in most qualitative researches.

Due to the lack of applicability of the VM in Sri Lankan construction industry, drawing a large sample of respondents for data collection is constrained. Moreover, employing VM in refurbishment projects in Sri Lanka is also emerging. The nature of the research problem which is *"how to enhance VM application in hotel refurbishment projects in Sri Lanka"* necessitated in depth investigation.

3.4 Research Process

The research process is described as a process encompassing multiple stages, although the precise amount of steps in completing a research can be varied (Saunders et al., 2009). The process of the research undertaken is presented in Figure 3.1.

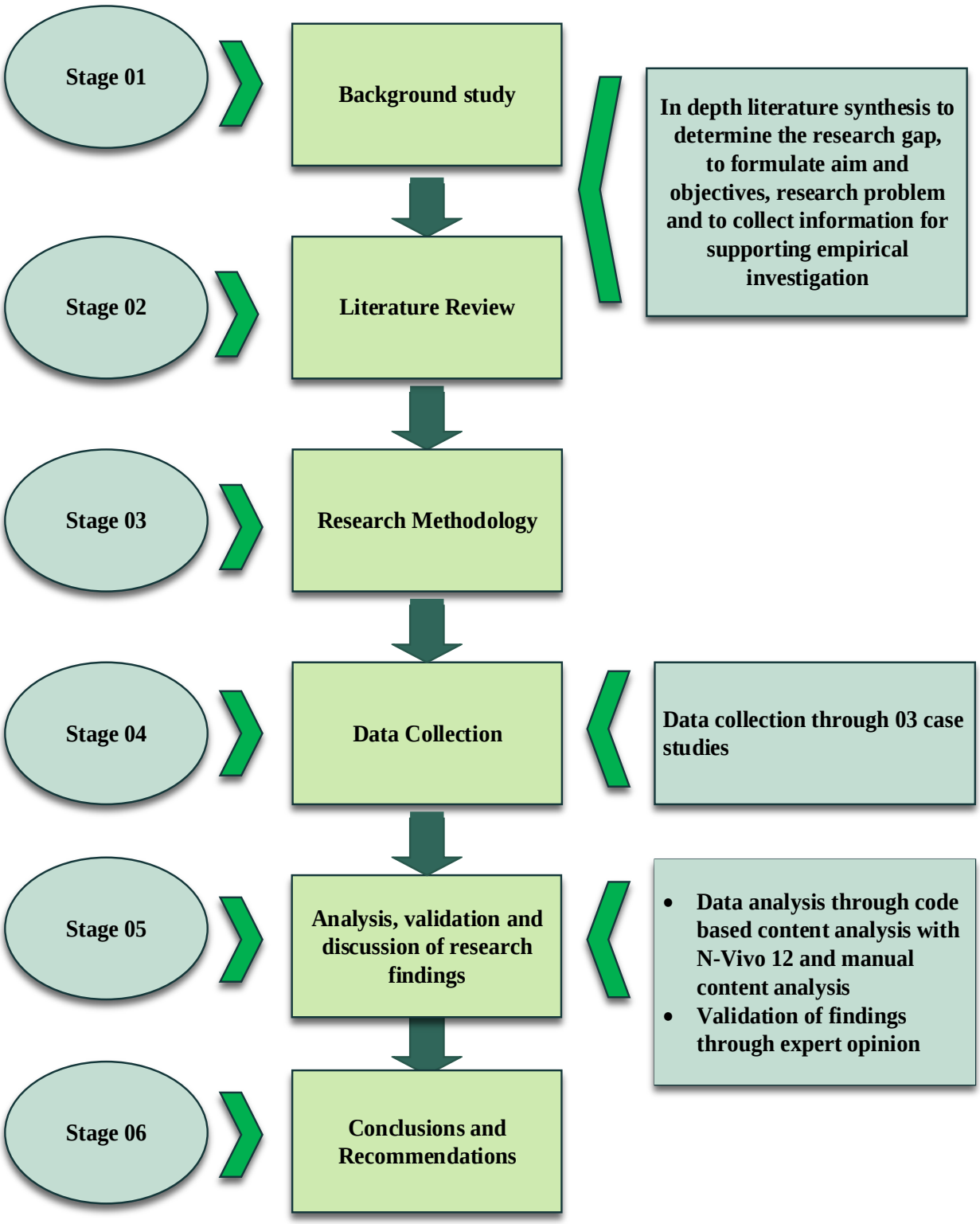


Figure 3.1: The Research Process

3.4.1 Background Study and Literature Review

As defined by Boote and Beile (2005), a literature review should address three criteria; "to present results of similar studies, to relate the present study to the ongoing dialogue in the literature, and to provide a framework for comparing the results of a study with other studies". For this study, a comprehensive literature study was conducted to review the application of VM approach to construction projects with a special emphasis on refurbishment projects.

3.4.2 Case Studies Approach

In contrast, Creswell (2013) claimed that qualitative data can be collected through surveys as well. Rose et al. (2015) explained that investigating a single or various amount of instances is employed in case studies technique and lack of generalisability of findings is a major concern. The author further recognised case studies as empirical investigations. Since an in depth investigation is necessary to answer the research problem, case studies approach was employed for this research.

According to Yin (2009), either a single case study design or multiple case study design can be undertaken when conducting a research. Since this research is focussed on enhancing VM application in hotel refurbishment projects in Sri Lanka in order to deliver value for client's money, drawing conclusions from multiple cases was mandated to conduct cross case analysis and to enable triangulation of findings. Accordingly, multiple cases were selected and unit of analysis, number of cases and criteria of selection of cases were identified appropriately.

3.4.3 Unit of Analysis

The main entity which is being analysed is known as the case in research (Yin, 2009). As proven in the background study and literature synthesis, due to the lack of applicability of VM in building projects, particularly in refurbishment projects of Sri Lanka, unit of analysis of this research is hotel refurbishment projects, which have employed VM.

3.4.4 Cases Selection

Yin (2011) emphasised that criteria for selecting a case depends on the convenience, judgement, time and cost constraints. In case studies approach, researchers should not

rely on random sampling, since selecting cases strategically provides a competitive advantage over random sampling (Patton & Appelbaum, 2003). Therefore, non-probability purposive sampling technique is used for selecting number of cases. Since the selection of cases is constrained by limited accessibility and time, cases were limit to three (03) hotel building refurbishment projects which have employed VM. Data saturation was another concern for limiting to three (03) cases.

3.4.5 Data Collection Methods

When selecting an appropriate data collection method, reliability, validity, appropriateness and amount of data to be collected are the main considerations (Polonskey & Waller, 2011). Kumar (2011) pointed out that data requirement to address the research problem as well as the benefits and drawbacks of each data collection method have to be considered, when selecting the most suitable data collection method. When conducting case studies, Elo and Kyngas (2008) and Yin (2009) stated that methods such as interviews, observations and document reviewing are the prominent. The author further indicated that there are three (03) types of interviews namely structured, semi-structured and un-structured interviews. According to Saunders et al. (2009), structured questionnaires and interviews predominate as quantitative data collection techniques whereas semi-structured interviews are widely used for qualitative data collection. Semi structured interviews facilitate researcher to ask less structured questions, while allowing to raise spontaneous issues as well, demonstrating their flexibility (Berg, 2009). Accordingly, semi-structured interviews were selected for this research to gather the opinions of the 18 respondents, since it would enable the researcher to gather specific information through structured questions and at the same time remain flexible to gather any other important information that may arise. Relevant documents such as Bill of Quantities (BoQ), drawings of the design proposals, photographic analysis documents of the project and archival records about the building were also reviewed. The use of multiple qualitative techniques for these case studies enhanced the validity and reliability of findings (Noor, 2008). In addition to that, observations can also add considerably richness to research data when the researcher wants to explore an ongoing phenomenon (Saunders et al., 2009). The researcher observed the refurbished areas,

which have implemented VM proposals. However, structured observations were constrained due to limited accessibility to certain areas of the hotels, such as guest rooms.

3.5 Data Analysis and Validation of Research Findings

Since the research administered a qualitative approach, qualitative data analysing techniques were used to analyse collected data. As pointed out by Hsieh and Shannon (2005), content analysis is one of the preferred methods to analyse text data and code them. Text data are usually in the form of verbal, electronic or printed format that are captured from interviews, surveys, observations, focus groups or printed media (Kondracki & Wellman, 2002). Walsh (2003) pointed out that coding schemes are created for the purpose of organizing concepts and analysing qualitative data. Hence content analysis provides subjective interpretation texts through a systematic coding and patterns (Hsieh & Shannon 2005). When analysing case studies findings, conducting cross case analysis and summarising using tabular presentation is useful (Rose et al., 2015). In order to facilitate content analysis of this research, the software called NVivo 12 manufactured by Qualitative Solutions and Research (QSR) International (Pvt) Ltd was used for code based content analysis technique. Furthermore, manual content analysis was also undertaken for the data analysis.

3.6 Summary

The research road map for achieving the aim of this research is discussed under research methodology. Brief descriptions on the research design, research approach and research process, which were undertaken are presented through this chapter. This research was conducted under qualitative approach. The background study, comprehensive literature survey, case studies, which were conducted with semi-structured interviews, observations and document reviewing as the data collection methods, data analysis and validation of research findings are the main stages in this research.

CHAPTER 04

4 ANALYSIS, RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the three (03) refurbished hotel projects, where VM has been exercised. Data was mainly gathered using semi structured interviews and documents review and analysed using code based content analysis technique using N-Vivo 12 software and manual content analysis.

4.2 Overview of the Data Collection Methods

The main data collection methods, i.e. semi structured interviews and documents review are elaborated below.

- **Semi Structured Interviews**

The respondents, who involved in the VM study of the project were interviewed using semi structured interviews. The interview guideline was organised in three (03) sections. Under Section 01, details of respondents were collected. Section 02 was focused on capturing details of the projects. Under Section 03, details about the VM application on those refurbished projects were obtained.

- **Documents Review**

The researcher referred documents such as VM proposals, BoQs, summary report of the VM workshop, drawings of the design proposals, photographic analysis documents of the project and archival records about the building.

4.2 The Profile of the Case Study Projects and Respondents

Data captured from the above means were used to develop a profile of the projects and the respondents. Table 4.1 presents the profile of the selected cases.

Table 4.1: Profile of the Cases

Case	Hotel status	Project scope	Contract price	Final project cost	Planned duration	Actual duration	Respondent ID	Respondent
Case A	• Five star • 19 storey • in Colombo	• Repairing and modernising lobby lounge, public toilets in the lobby, Chinese restaurant, all day dining restaurant, main kitchen, board walk, executive lounge including MEP services • Procurement and replacement of kitchen and laundry equipment • Renovating lotus pond, AHU room, fire commanding centre and lift lobby	LKR 220,000,000	LKR 250,000,000	9 months	14 months	A1	Project Manager
							A2	Cost Consultant
							A3	Lead Design Consultant
							A4	Main Contractor
							A5	Chief Financial Officer (CFO)
							A6	Chief Engineer (MEP Engineer)
							A7	Maintenance Engineer
Case B	• Five star • 4 storey • in Colombo.	• Upgrading car park, lift shaft, glass roofs for two restaurants, retractable roof for the dining room, veranda of bar and pool bar, bathroom tiling and glasswork, timberworks for bathroom doors, • Replacement of kitchen and laundry equipment, • Maintenance of extra low voltage system • Repairing the ceiling and floor of grand ball room, the balcony areas and MEP services	LKR 145,000,000	LKR 147,000,000	8 months	10 months	B1	Project Manager
							B2	Cost Consultant
							B3	Chief Architect
							B4	Main Contractor
							B5	Finance Manager
Case C	• Four star • 3 storey • in Gampaha	• Upgrading 81 rooms, central air conditioning system, fire alarm system, plumbing works, glass work in bathrooms, lighting and corridors, • Façade maintenance • Repairing timber floor, gully and sewerage system • Tiling in the kitchen • replacement of kitchen and laundry equipment, maintenance of extra low voltage system, • Installation of painted glass screens in the front office and bathrooms • Modifying the swimming pool	LKR 136,500,000	LKR 137,800,000	6 months	9 months	C1	Project Manager
							C2	Cost Consultant
							C3	Designer
							C4	Main Contractor
							C5	Finance Manager
							C6	Maintenance Manager

Analysis of the scope infers that all the selected buildings have extended the same use instead of changing the use, with renewing and repairing. Moreover, these projects have adopted traditional procurement method and re-measurement contract for the project.

The respondents were selected from the project team members, who involved in the VM study of the project. The profile of the respondents is presented in Table 4.2.

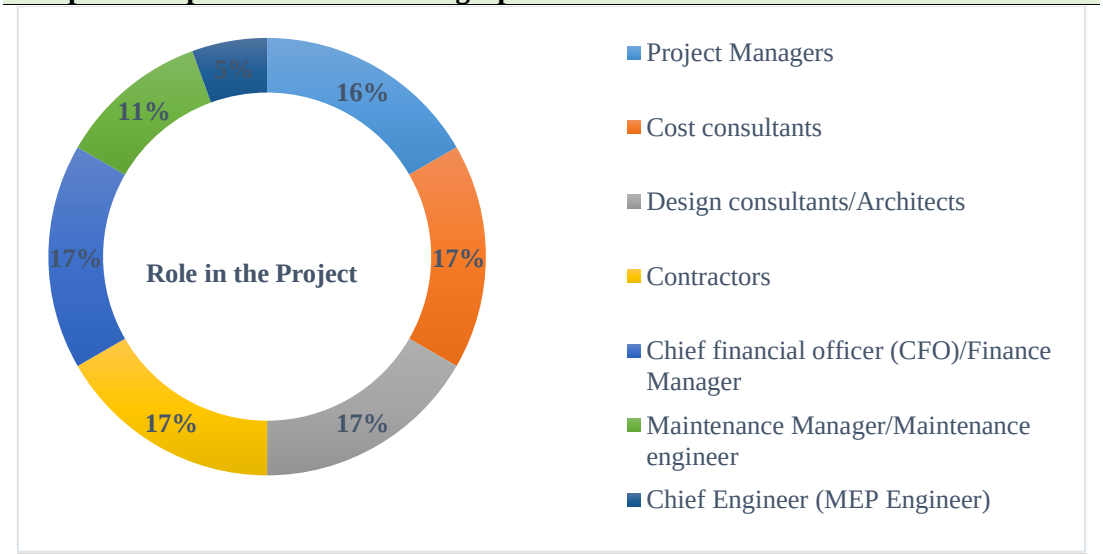
Table 4.2: Demographic Profile of the Respondents

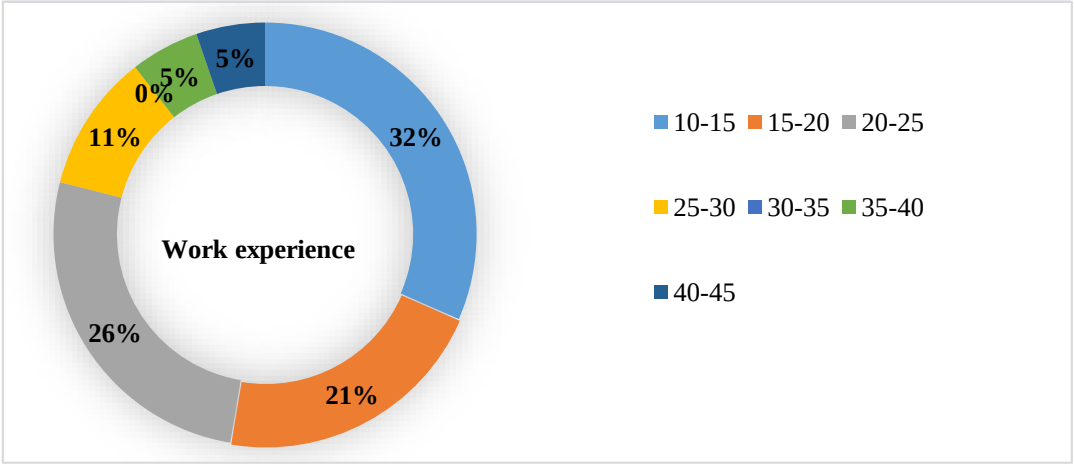
Demographic information		Number out of 18
Role in the project, by profession	Project Managers	3
	Cost consultants	3
	Design consultants/Architects	3
	Contractors	3
	Chief financial officer (CFO)/Finance Manager	3
	Maintenance Manager/Maintenance engineer	2
	Chief Engineer (MEP Engineer)	1
Work experience (years)	10-15	6
	15-20	4
	20-25	5
	25-30	2
	30-35	0
	35-40	1
	40-45	1
Prior experience in VM (years)	1-5	11
	5-10	3
	10-15	4

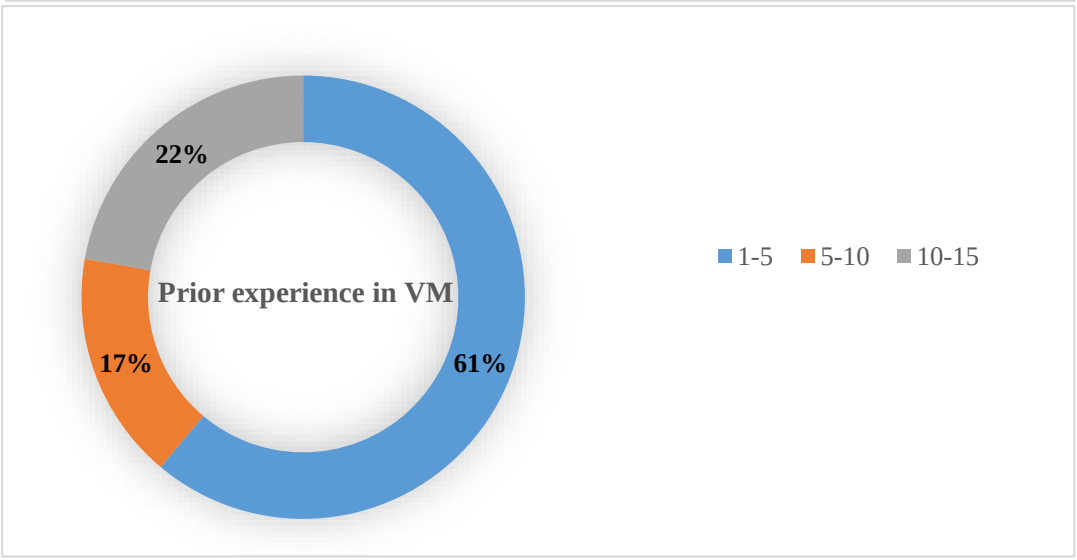
Graphical representation of above demographic information is presented in Table 4.3.

Table 4.3: Graphical Representation of Demographic Information

Graphical Representation of Demographic Information







All the case studies had employed a Project manager, a Cost Consultant, a Design Consultant, a Contractor and a Financial Officer representing the Client. Although all the respondents had work experience of more than 10 years, due to the less applicability of VM in the Sri Lankan context, less prior exposure to VM applications is evident.

4.3 Views on the Terminology "Refurbishment"

The respondents were requested to explain their views on the terminology, "refurbishment", which are presented in Table 4.4. They were further asked about the main purpose and the time span for undertaking refurbishment.

Table 4.4: Views on Refurbishment

Respondent ID	Views
A1	*"Refurbishment considers **modifying** the building after about a decade of operation"*
A2	*"It is basically a **modification and upgrading** done to the existing building to uplift the standards and required functionality".*
A3	*"It is the start of second life of the building"*
A4	*"Refurbishment covers **renovation, retrofitting**, **modifications, repairing**, **upgrading, restoration and extension**"*
A5	*"Building needs major **repairs and renovations** at least within the first 10-15 years of operation"*
A6	*"Existing building **is modified** through refurbishment"*
A7	*"Refurbishment is a boost provided for the building to uplift the existing standards and conditions"*
B1	*"Buildings are mainly **repaired, renovated, retrofitted, restored** through refurbishment with the main aim of **modifying and upgrading** to meet the current demand and standards"*
B2	*"Refurbishment encompasses **renovation, retrofitting, modifications, repairing, upgrading, restoration and extension** to the existing building to deliver the expected functionality of the building"*
B3	*"It is a **modification and upgrading** to the existing building structural elements as well as building services to provide a better environment for the building occupants".*
B4	*"It is viable to do refurbishment for hotels to uplift their condition and **modify** after at least 15 years of operation, because it takes only 6 months to 1 year on top to refurbish and they can basically operate the hotel, while refurbishment is going on"*
B5	*"Refurbishing is like the second life of the building or like an update"*
C1	*"It includes **renovation, retrofitting, modifications, repairing, upgrading** of the current building, which is to be used for the same purpose it was built for, but with a better quality, performance and functionality".*
C2	"*After the first 10 years of operation, the building itself demands **repair, modification and upgrade***"
C3	*"Mostly within 10-15 years, buildings need a face lift through refurbishment"*
C4	*"The second life of the building is initiated with refurbishment"*
C5	*"Generally refurbishment is a **modification and upgrade** to the current purpose of the building"*
C6	*"Refurbishment covers **renovation, retrofitting, modifications, repairing, upgrading** of the existing building to function well"*

After analysing the terminology, “refurbishment”, generated from the opinions of the respondents, it can be encapsulated that refurbishment encompasses renovation, retrofitting, repairing, restoration and extension to the existing building to deliver the expected functionality with better performance and it is primarily focussed on upgrading and modifying the building generally after 10-15 years after the commencement of building operations.

4.4 Current Status of Hotel Refurbishment Projects in Sri Lanka

From the opinions of all the respondents, it was evident that refurbishment projects in Sri Lanka are predominant in hotel sector buildings. As pointed out by all of them, this is eminently because of the fact that Sri Lanka is a famous tourist destination and hotels need to attract tourists. In order to maintain that attraction, hotels have to be modified and upgraded in higher frequency compared to other types of building facilities. Since refurbishment provides means for modifications and upgrades for the building, hotel refurbishment projects are comparatively higher. A1 confirmed; “*Sri Lanka is a famous tourist destination. So, unlike other buildings, hotels maintain their status quo and keep up to date functionality. Refurbishment provides the means for this required updating and modifications”.*

In addition, since these buildings operate on a daily basis throughout the year, the upgrading and modification needed for the building services are also delivered through refurbishment. According to C6, *“Since hotels operate 24 hours every day, building services also need modifications like scheduled maintenance, overhauls and timely repairs”.*

In this context, in Sri Lanka, hotels cannot afford shutting down operations entirely and thus refurbishing is mostly done simultaneous to operations. Therefore, causing disruptions to hotel guests and hotel staff and preserving hotel buildings with archaeological and architectural values with limited alterations are the two (02) main concerns of the project team. Nevertheless, hotel refurbishment projects are undertaken at a higher frequency than the other refurbishment projects in Sri Lanka.

4.4.1 Reasons for Undertaking Refurbishment

Although all the respondents endorsed that refurbishment should be undertaken to modify and upgrade the existing building conditions, the specific reasons, which enabled the refurbishment in the case study buildings were analysed and illustrated in the code structure of Figure 4.1.

Name	Sources	References
Reasons for undertaking refurbishment projects	18	62

Name	Sources	References
To enhance aesthetic appearance and modernise existing condition	18	18
To compete with rival hotels	18	18
Major modifications and upgrades have not been done in a while	10	10
To safeguard and improve star rating	7	7
To maintain the standards of the parent company	5	5
To preserve architectural, archeological and historical value	4	4

Figure 4.1: Reasons for Undertaking Refurbishment

The refurbishment decision was conceived as a result of many attributes. The two (02) major reasons for undertaking refurbishment for the case study buildings were to compete with rival hotels and enhance aesthetic appearance and modernise existing conditions. Therefore, the selected hotels have continued with the existing operation by enhancing achieved through refurbishment. Cases A and B are two (02) of the oldest five star rated hotels in Colombo and thus all the respondents advocated the view of being competitive. Case C, which is also popular as one of the oldest transit hotels in Sri Lanka was also focussed on remaining competitive in terms of hosting guests and upgrading to new trends in order to overcome the challenges, the hotel encounters. B3 emphasised; "*This hotel commenced its operations over 150 years ago. It is one of the oldest 5 star hotels in Sri Lanka. So to achieve the competitive edge, hotel needed to be refurbished".*

Furthermore, as highlighted ten (10) respondents, refurbishment was necessitated because major modifications and upgrades have not been done in a while in all the case study buildings. The last refurbishment of Cases A, B and C were undertaken in 2001, 2006 and 1993 respectively. A1 explained; *"By the time, refurbishment started, hotel was 27 years old. From time to time, few small scale renovation and repairing*

projects were done to keep the hotel in good standards. However, the last renovation was undertaken in 2001".

Safeguarding and improving the star rating of the hotel was also a drive for refurbishment. Notably, respondents of Case A and Case B explained that since the hotels have long been in operation as five star rated hotels, safeguarding the star current status and improving to the next level is vital. Conversely for Case C, the current focus is to upgrade to the next level of star rating. In addition to the most significant reasons, respondents pointed out some unique reasons, which prompted the decision to refurbish. The need to maintain the standards of the parent company prompted the decision of refurbishment. Preserving architectural, archaeological and historical value was a unique reason for Case B. B3 asserted *"Being probably the oldest functioning hotel, we had to ensure that architectural features concerning heritage and cultural aspects attributed to British era and the archaeological value of the hotel remained preserved and intact* through *subtle modernisation"*.

The opinions of the respondents prove that the decision to undertake refurbishment can be triggered due to many factors as discussed above.

4.4.2 Stages and Activities of a Refurbishment Project

When the respondents were requested to explain the stages or the main activities of a refurbishment project, their ideas were recapitulated in to six (06) stages as illustrated in the code structure of Figure 4.3. It can be noted that since the respondents such as Maintenance Engineer and the Chief Engineer in Case A and Maintenance Manager in Case C had joined the project towards latter stages, they did not comment on the initial stages of the project.

Stages or the activities of the refurbishment project	18	94
Name	Sources	References
Stage 1- Project initiation and briefing stage	15	15
Stage 2- Concept design stage	14	14
Stage 3- Technical design stage	13	13
Stage 4- Tender stage	15	15
Stage 5- Demolishing activities and construction stage	18	19
Stage 6- Project handover and close out stage	18	18

Figure 4.2: Coding Structure for Stages of a Refurbishment Project

Being distinctive from the new construction projects, stages of a refurbishment projects are difficult to be organised in a sequence because the refurbishment process is focussed on an existing building and depending on the conditions of the building, design solutions are generally prone to changes even during the demolition and construction stage. The projects were procured under traditional procurement method. The stages of the projects were organised under the pre contract and post contract phases. In fact, A2, B3 and C2 recommended to use traditional procurement for specially for hotel refurbishment projects, because clients, who expect a high degree of quality in modernising and upgrading are generally reluctant to pass the risk of unanticipated building conditions to the contractor.

Although the respondents used slightly different terminologies to recognise stage 1 of the project, the explanations were similar to a great extent. B4 added; "*Client briefed his requirements to the consultants and the project manager and defined the scope of the project and carried out the feasibility study"*. Hence, stage 1 was recognised as "project initiation and briefing" stage.

Expressing his views on stage 2 of the project, C3 explained that concept design is where schematic drawings are developed and as the stage 3 of the project, development of technical designs are undertaken. However, A5 and C5 recognised both these stages as the design stage. Only 13 respondents were able to distinguish concept design and technical design. Since the two design stages are distinctive, "concept design" and "technical design" were identified as stage 2 and stage 3 respectively. According to the traditional procurement method, stage 4 is the "tender" stage, where the contractor is selected based on the competitive bid. In Case B, tender stage was treated as two sub phases. As per B3, *"Initially tender stage was recognised as pre tender stage, during which the contractors were asked to do a mock up and based on the lowest bid, tender was awarded and subsequently post tender stage was taken place".*

Subsequent stage as agreed by all the respondents was the stage 5 recognised as "demolition and construction" stage, in which the demolition activities and construction works are carried out. According to A2, A4, B4 and C2, gradually areas were released to the contractor in accordance with the isolation plan and required

design details, drawing and specifications were transferred to the contractor, who immediately mobilised. However, A5, B5 and C5 named this stage as the construction stage neglecting the demolition activities, which are carried out before construction works. C4 highlighted; "*Having a safety strategy and isolation plan during both demolition and construction is vital, if the refurbishment is done in simultaneous to the operations"*

This stage was followed by the final stage of the project, which was named as the "project handover and closeout" stage. A3, B4 and C5 recognised it as the project completion stage, in which the project is completed and handed over to the client. B3 and C4 recognised it as the handover stage C6 and A7 called it the close out stage. Respondents explained that issues occurred during the refurbishment project are generally recorded during this stage. Furthermore, the maintenance department of the hotel need to involve in the testing commissioning works of the equipment and feedback from the end users are considered for the future projects or upcoming phases of refurbishment. Findings from the case studies on the stages of refurbishment projects is illustrated in Figure 4.4.

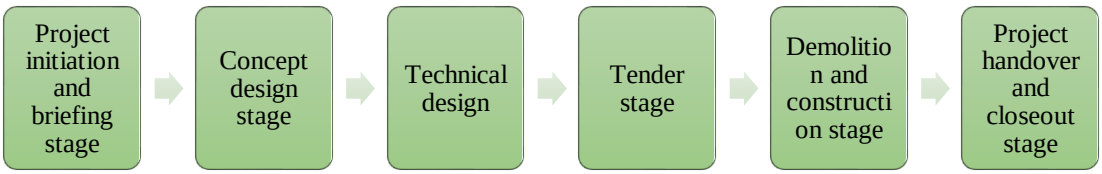


Figure 4.3: Stages of a Refurbishment Project

Accordingly, the stages and activities of the refurbishment project are compressed in to six (06) stages

4.5 Challenges in Hotel Refurbishment Projects in Sri Lanka

The respondents were inquired about the challenges that they encountered during the refurbishment project. These challenges were explained from the point of view of their role in the project as demonstrated in the code structure of Figure 4.5.

Challenges of the refurbishment project	18	131
Name	Sources	References
Budget overruns due to superficial designs and construction	18	18
Limitations to introduce changes to the existing building stru	18	21
Interruptions to building occupants due to simultaneous ope	18	20
Time overruns due to refining designs to cater unanticipated	18	18
Lack of as built drawings and site information	12	12
Lack of coordination and communication of project participa	9	9
Insufficent safety precautions on site	7	7
Inadequate identification of client's requirements	5	5
Lack of standardised testing and commissioning of the buildi	5	5
The difficulty of reusing existing material and equipment due	4	4
Traditional procurement method restrained the contractor's i	3	3
Absence of a proper isolation strategy to systematically assi	3	3
Lack of secured places in the site to store construction equi	2	2
Lack of supervision	2	2
Existing buildings are subjected to legislative constraints	2	2

Figure 4.4: Challenges in Hotel Refurbishment Projects

The hotel refurbishment projects are deemed to be uncertain and complicated in nature as per the opinions of the respondents. As pointed out by A5, "*The initial designs by the designers exceeded our budget. Reviewing various design options along with budgets consumed a huge time".*

Emphasising the limitations on building conditions, respondents explained that certain planned changes could not be introduced because of the architectural and archaeological conditions of the existing building structures and limitations in the building services layouts. B2 highlighted; "*Restrictions to incorporate sustainable designs due to having to conform to archaeological limitations"* Challenges due to simultaneous operations in the building were inevitable because the guests were interrupted by refurbishment activities and hotel staff including kitchen and laundry employees were disturbed during daily operations. As pointed out by C4; *"Complaints from guests due to noise in the demolition works especially during our night shift was a burden"*

Lack of as built drawings and site information resulted in high dependence on vague assumptions to devise design solutions. Respondents also pointed out about the insufficient safety precautions on site because some structures were collapsing during the demolition activities and construction workers could get injured. Among the other challenges, difficulty of reusing existing materials and equipment due to damages in the dismantling and storing is noteworthy and moreover, they had become non suitable and un matching. Lack of coordination and communication of certain project participants was challenging. According to A2, *"Because of involvement of few foreign entities and they work in their native countries, the coordination between the parties was a big hurdle"*

Lack of secured places in the hotel premises to store construction equipment was challenging primarily for the contractor. A4 stated; *"There were no safe spaces within the hotel to store procured kitchen and laundry equipment and contractor had to hire warehouse outside Colombo".*

In addition, lack of standardised testing and commissioning of the building services and equipment was also noted during the project handover and closeout stage, when coordinating with the maintenance department. Contractor's lack of knowledge about the standard test requirements could delay the completion because the maintenance staff could not be made knowledgeable about operation and maintenance procedures of newly installed services. All the contractors involved in the project complained that traditional procurement method restrained the contractor's input to design alternatives since the contractor joins the project after the design decisions are made and some initial design ideas are irreversible. Moreover, inadequate identification of client's requirements was notable during the design stages, which resulted in refining designs. Absence of a proper isolation strategy to systematically assign the areas in the hotel for the refurbishment, while the other areas are in operation was also emphasised as a challenge. According to A1, *"In the isolation plan submitted by the lead consultant by identifying the areas that can be allocated for part by part refurbishment, cold room was missing and the project execution plan formulated based on it, had to be revised twice".*

Lack of supervision during the demolition and construction stage was a challengeable for Case B, since the construction workers could not be managed properly to meet the project milestones. The respondents of Case C claimed that existing building was subjected to legislative constraints. As a result, certain standards had to be adhered to and such legal processes consumed additional time and cost. C3 expressed; *"Achieving ISO certifications and being complaint to waste disposal as per municipal regulations made us to limit choosing some material"*. In a summary, as per the opinions of the respondents, all aforementioned challenges were classified in to two (02) categories as challenges due to existing building and the challenges due to project team as presented in Table 4.5.

Table 4.5: The Classification of Challenges

Due to existing building	Due to project team
• Time overruns due to refining designs to cater unanticipated building conditions • Limitations to introduce changes to the existing building structures • Lack of as built drawings and site information • Lack of secured places in the site to store construction equipment • Existing buildings are subjected to legislative constraints • The difficulty of reusing existing material and equipment due to damages and non-suitability	• Budget overruns due to superficial designs and construction activities • Interruptions to building occupants due to simultaneous operations • Lack of coordination and communication of project participants • Lack of supervision • Insufficient safety precautions on site • Lack of standardised testing and commissioning of the building services and equipment • Traditional procurement method restrained the contractor's input to design alternatives • Inadequate identification of client's requirements • Absence of a proper isolation strategy to systematically assign the areas in the building for the refurbishment, while the other areas are in operation simultaneously

As per all the 18 respondents, the impacts of the aforementioned challenges were vastly visible at the end of the project.

4.6 The Impacts of the Challenges in Achieving Value for Money

Since the unanticipated challenges hindered the achievement of project milestones and the expected delivery of functions while the projects were on-going. Therefore, the respondents were requested to indicate the key attributes considered to evaluate value for money.

In all case study projects, cost, time and quality were the predominant attributes related to value for money as pointed out by all the respondents. B1 commented; *"We understood halfway through the project, the inevitable challenges would force us to increase the budget, increase the time duration and some mere design alternatives were questionable in achieving the quality".*

Therefore, the necessity of achieving value for money was triggered to reduce unnecessary costs of unnecessary functions, to make the tasks more efficient to prevent time delays and to generate alternatives to deliver the expected quality. In addition to the three key factors, customer satisfaction was also considered as an attribute considered in the case study projects to realise value for money. In these projects, the customer is referred to as the hotel customers, who are also the end users. A5, A7, B5, C5 and C6 highlighted how customer satisfaction was attributed to deliver value for money. A5 explained; "*We had a huge loss of potential clientele and the after-tax profit was reduced to LKR. 26.6 million from LKR. 122.6 million a year, while the refurbishment was going on. Occupancy was also down to 38% from 43%, mainly due to refurbishment".*

Accumulation of demolition waste was a significant issue for Case A, since the parent company had instructed the project team to reduce the impact to environment through the refurbishment project. Hence in terms of sustainability, value for money was not delivered. In Case B, the client had encouraged the project team to deliver sustainable design solutions, where possible. Nevertheless, B2 highlighted; *"There were restrictions to incorporate sustainable designs due to having to conform to archaeological limitations in the building"*.

In this context, the attributes to achieve value for money in can be identified as follows:

- Cost

- Time
- Quality
- Guest Satisfaction
- Sustainability

Although the challenges are termed differently, respondents opined that they were constricted to cost and time overruns, quality impairments, dissatisfaction of hotel guests and lack of sustainability in terms of the impact on degrading value for money.

4.7 Application of VM in the Refurbishment Projects

In order to achieve value for money, the approach undertaken in the case study projects was applying VM. However, all the respondents claimed that it was more often recognised as VE. The respondents, who have prior experience in VM application declared that current status of VM application in refurbishment projects of Sri Lanka is low. A2 claimed; "*This project is the first time we were applying VM for refurbishment projects in Sri Lanka as per the best of my knowledge, still not entirely as per the theory".*

When considering the application of VM in these projects, all the respondents opined that it was applied in an ad-hoc manner. Inadequate time and expertise to conduct a theoretically systematic VM approach during the demolition and construction stage was another reason. The VM workshop of all the three cases was conducted using the prior experience and knowledge on VM of the project team. Since there are no certified value specialists in Sri Lanka, the cost consultant of each project had played the role of the VM facilitator.

4.7.1 Reasons for Applying VM

Many opinions were presented when the respondents were requested to state the reasons for applying VM as the approach to achieve value for money in the case study projects. Their opinions are summarised in the code structure of Figure 4.5.

Reasons for applying value management in refurbishment projects		18	43
Name		Sources	References
As a cost cutting exercise		18	18
To logically compare among design alternatives		9	9
Easily understandable and executable		7	7
To deliver better technical solutions for improving quality		6	6
VM provides the simple step by step approach to incorporate value to the project		3	3

Figure 4.5: Reasons for Applying VM

All the respondents perceived VM as a cost reduction technique, which prompted them to apply it for the refurbishment process. A1 opined; *"VM was applied in the construction stage by revisiting design alternatives perceiving it mainly as a cost reduction technique, because in this project, client needed to cut lots of costs"*

Half of the respondents claimed that VM can provide the opportunity to logically compare design alternatives by revising design solutions, because the VM exercise could generate many options. Since VM is easily understandable and executable, the respondents decided to employ it for the project. C3 expressed; "*It was easily understood by everyone, whom without the prior exposure and easily executable as well"*

Furthermore, the use of VM as an approach of delivering technical solutions to improve quality was also noted. Since VM provides the simplified steps to apply value to the project, it was used by the respondents as the value achieving technique. Nevertheless, by analysing these reasons, it can be suggested that main driver for applying VM in the selected cases was to use it as a cost reduction exercise.

4.7.2 The Overview of the VM Job Plans

The overview of the VM job plans adopted by case study projects are summarised in Table 4.6.

Table 4.6: Details of the VM Job Plan

Category	Case A	Case B	Case C
VM job plan	SAVE 40 hour job plan	Contractor's change proposal	SAVE 40 hour job plan
Timeframe to apply VM	Demolition and construction stage	Post tender stage	Demolition and construction stage
Venue	Hotel premises	Hotel premises	Hotel premises
Duration of the VM workshop	3 consecutive days (6 hours maximum per day)	2 consecutive days (6 hours maximum per day)	3 consecutive days (5 hours maximum per day)
Composition of the VM team	• Project manager • Cost consultant • Lead design consultant • Chief financial officer • Main contractor • MEP engineer • kitchen and laundry consultant • Interior designer • Maintenance engineer	• Project manager • Cost consultant • Chief architect • Finance manager • Main contractor	• Project manager • Cost consultant • Designer • Finance manager • Main contractor • Maintenance manager
VM objectives	• Cost reduction • Enhancing quality. • Reducing time delays • Enhancing sustainability • Improving hotel customer satisfaction	• Cost reduction • Reducing time delays • Enhancing quality • Improving sustainability	• Cost reduction, • Reducing delays • Improving quality • Enhancing hotel customer satisfaction
Cost of VM study	No additional cost was incurred for the VM study, since VM workshop was conducted during the scheduled project meetings and no external party got involved		

As inferred from Table 4.6, Cases A and C had adopted similar approaches, in terms of the VM study, while Case B exhibited certain differences, in terms of the VM job plan, time frame of applying VM and VM team composition. All the case study projects had used the building premises as the venue for VM workshop. The expenses for the post contract phase covered the expenses of the project team. The nature of the VM study adopted in each case study project are discussed comprehensively in the subsequent sections.

VM Study of Case A

In this project, A1 claimed that impetus for initiating a VM study was emerged during the initial design stages and the main focus was to reduce the cost overruns. But VM was actually applied to the project after the contractor joined the projects, because during the demolition and construction stage, a considerable amount of redesigning was required due to the problem encountered after removing the existing finishes layer and the contractor had to carry out additional works which led to delays in project milestones. A3 noted; *"Design and construction changes were unavoidable and we knew we will have cost and time overruns".*

The VM team was not able to follow a structured VM study for the project. Kitchen and Laundry Consultant and Interior Designer are foreign participants.

VM Study of Case B

VM proposals were anticipated by the contractor after identifying the value enhancing opportunities during the mock up refurbishment. In order to come up with the lowest bid, he had presented many cost reducing options, which he perceived as applying "VE" to the project. Nevertheless, he had not submitted the change proposal during the tender stage, before getting awarded with the tender. B4 explained; *"It is actually a risk to disclose VE proposals during bidding, because there's no guarantee you will get the contract and someone else might steal the ideas and apply to the project without giving credit to you".*

As explained by the contractor, it can be stated that contractor's change proposals are not submitted before the award of the tender in Sri Lanka, because the intellectual rights of the contractor will be damaged and competitive advantage will be lost. Right after the tender was awarded and before the construction activities began, the VM workshop was conducted with the participation of the project team. Although the VM proposals were initiated by the contractor, the rest of the project team opined that VM was not only about cost reduction. Since VM was employed during the post tender stage, time was inadequate to follow the VM workshop in line with the theory and it was conducted to evaluate the contractor's VM proposals.

VM Study of Case C

The hotel building had been dilapidated and the project team realised it only after the mock up refurbishment conducted by the invited contractors during the pre-tender stage. This mock-up was undertaken for a guest room. C1 indicated; *"The conditions seemed to be more unanticipated, when the demolition works started and we were behind the scheduled milestones".*

Hence the client instructed to take necessary actions to prevent time delays and to reduce budget overruns by introducing cost reducing alternatives, while maintaining the required quality level. During the construction stage, the project members teamed up with the maintenance staff, led by the maintenance engineer and convinced the client on applying VM for the project.

Table 4.7 presents the activities of VM process carried out during the VM studies of case study projects.

Table 4.7: The VM Job Plan of Cases A, B and C

	VM Process	Case A	Case B	Case C
Pre workshop stage	**Initiation stage**			
	• Forming the VM team	✓	✓	✓
	• Briefing on the VM study by the cost consultant	✓	✓	✓
	• Communicating VM objectives •	✓	✓	✓
	• Brainstorming to make all members aware of VM study	✓	✓	✓
	• Formulating a work plan on implementing VM study		✓	
	• Conducting initial discussion on the contractor 'proposals		✓	
Workshop stage	**Information gathering**			
	• Gathering information on recently completed projects with similar scope	✓	✓	✓
	• Information gathering as built drawings, initial design proposals, original BoQs	✓	✓	✓
	• Identifying problems identified during the preliminary site survey and initial demolition works	✓	✓	✓
	• Presenting the problems identified during the mock up refurbishment		✓	✓
	• Discussions with the client to understand his requirements.			✓
	Project functions analysis			
	• Determining the required functions related to the suggested scope	✓	✓	✓
	• Eliminating unnecessary functions within the scope using functional analysis	✓	✓	✓

	VM Process	Case A	Case B	Case C
	• Identifying value enhancing opportunities	✓	✓	✓
	• Assigning costs per function	✓	✓	✓
	• Determining the worth of function	✓		
	Options developing			
	• Generating ideas for each of the accepted VM proposal	✓	✓	✓
	• Generating design and construction options for performing each proposal	✓	✓	✓
	Analysis of VM proposals and development			
	• Analysing alternatives and developing BoQs for each of these alternatives	✓	✓	✓
	• Initial cost reduction was the main parameter. Other parameters considered were time of construction or installation, quality enhancement, ease of maintenance, aesthetic appearance, material availability, durability, strength and suitability	✓	✓	✓
	• Ranking the alternatives	✓	✓	✓
	• Selecting the best alternatives after evaluating the ranked options through checklists.	✓	✓	✓
	Presentation			
	• Converting best alternatives in to written recommendations	✓	✓	✓
	• Project manager presented them to the VM team	✓	✓	✓
	• Developing Action plan for executing the options by setting project milestones	✓		
	• Obtaining approval of the project team for the implementation of VM proposals		✓	
	• Assigning responsibilities and resources with project milestones	✓		✓
	Close up stage			
	• Implementing accepted VM proposals	✓	✓	✓
	• Conducting follow-up session with the use of multimedia presentations	✓	✓	✓
	• No formal procedure to do the follow up, but if the cost allocation and timeframe were met, it was considered satisfactory	✓	✓	✓
Post workshop stage	• Project manager did a presentation and VM team members had a discussion on the outcomes of the VM study.	✓		
	• Conducting feedback session to apply the VM process for the upcoming refurbishment project			✓
	• Recording benefits and drawbacks of this VM study to execute a well-planned VM process for the upcoming refurbishment projects			✓

Some activities were common to all the cases and thus they were categorised under corresponding VM stage. Case A had attempted to match with the standard SAVE 40-hour job plan although the exact terminologies were not used. Case C had also employed a VM job plan derived from the standard SAVE 40-hour job plan with high correspondence to the VM process. Even though the contractor had initiated VM

proposals in Case B, the VM process employed had been derived from standard SAVE 40-hour job plan.

VM tools and techniques employed for the aforementioned VM studies are presented in Table 4.8.

Table 4.8: VM Tools and Techniques

VM Process		Case A	Case B	Case C
Pre workshop stage	**Initiation stage**			
	Brainstorming	✓	✓	✓
	Presentations	✓		
Workshop stage	**Information gathering**			
	Presentations	✓	✓	
	Brainstorming	✓	✓	✓
	Project functions analysis			
	Function Analysis	✓	✓	✓
	Options developing			
	Brainstorming	✓	✓	✓
	Discussions		✓	✓
	Analysis of VM proposals and development			
	Checklists	✓	✓	✓
	Cost benefit analysis	✓		
	Ranking	✓	✓	✓
	Presentation			
	Summary report	✓		
	Action plan	✓	✓	✓
Post workshop stage	**Close up stage**			
	Summary reports	✓	✓	
	VM questionnaire			✓

Respondents had not placed a significance on VM tools and techniques and the aforementioned are the tools and techniques they had used.

4.7.3 Overview of the VM Proposals and their Impacts

Some value enhancing opportunities which were identified during the VM study were converted to VM proposals, while some of them were unsuccessful as presented in Table 4.9.

Table 4.9: Value Enhancing Opportunities Identified

Case Name	Value enhancing opportunities	Successful/ Unsuccessful	Reasons for being unsuccessful
Case A	**AI**. Installation of four decorative metal screens with satin bronze finish to the wall in lobby area	Successful	

Case Name	Value enhancing opportunities	Successful/ Unsuccessful	Reasons for being unsuccessful
	AII. Installation of hanging glazed pendant lamps in "All day dining restaurant	Successful	
	AIII Choosing stone tiles as the floor finish for the "Chinese restaurant"	Successful	
	AIV Repairing the suspended ceiling in the reception area	Successful	
	AV Installation of a new chandelier in "All day dining" restaurant by replacing the existing chandelier	Unsuccessful	It could consume a lot of cost and time and in terms of function, they seemed unnecessary because the existing chandelier was in good condition and maintenance effort can improve its appearance
	AVI Installation of a retractable roof for the "Chinese Restaurant"	Unsuccessful	Difficulty of installation, because the hotel was still in operation. It was also cost and time consuming
Case B	**BI** Less cost incurring option for the retractable roof of the dining hall	Successful	
	BII Alternative suggestions for chandeliers in the Grand ballroom and the dining hall	Successful	
	BIII Alternatives for pendant lamps in the 03 bar restaurants	Successful	
	BIV For bathroom tiling, granite countertops were proposed instead of the originally proposed marble countertops	Unsuccessful	The client wanted to use marble for the countertops, although granite was less expensive and easy to maintain, client insisted that marble should be used.
Case C	**CI** Replacing the mirror finished suspended ceiling in the corridor with a less expensive alternative	Successful	
	CII Proposing alternative for the vanity counter set with a granite top and leather finish	Successful	
	CIII Replacing the sandblasted glazed screen in the lobby area with a less expensive alternative	Successful	
	CIV Alternative proposal for bed side lamps in 81 rooms	Successful	

The successful VM proposals and the decisions made in formulating them along with the resultant impacts are presented in Table 4.10.

Table 4.10: VM Proposals and Their Impacts

VM Proposal	Description	Impact
Proposal AI Instead of initial proposal of 04 satin bronze decorative metal screens on walls in lobby area, laminated HDF boards of 2400*3000mm in metallic paint finish were proposed	• Functional requirement- enhancing aesthetic appearance by providing a metallic finish • Cost of initial proposal- unit cost of LKR 446690.35 • Cost of alternative- unit cost of LKR 358491.33	• Cost saving- LKR 88,199.02. • The metallic paint finish resembles the satin bronze finish without impairing the expected quality.
Proposal AII The quantity of hanging glazed pendant lamps in the "All-day dining restaurant" in the initial proposal was reduced from 46 to 42 and a less expensive brand of pendant lamps was selected as a result of amendments in the layout of the restaurant	• Functional requirement- enhancing aesthetic appearance and maintaining desired illuminance level • Cost of initial proposal- unit cost of LKR 424217.30 and for 46 lamps, LKR 19,514,000.00 in total. • Cost of alternative- unit cost of LKR 177167.68 were introduced reducing the total quantity to 42 lamps	• Cost saving - LKR 12,072,960.00 • Exploring for a less expensive brand consumed time • No reduction in the illuminance level and no harm to aesthetic appearance
Proposal AIII Instead of 20mm stone tiles in the initial proposal, engineered timber flooring of 900mm wide x 15mm was proposed to be fixed on an area of 80m^2 in the "Chinese restaurant".	• Functional requirement- durability and aesthetic appearance • Cost of initial proposal- unit rate of LKR 47304.23 • Cost of alternative- unit rate of LKR 36779.69,	• Cost saving- LKR 841963.20 • Less time consuming • Impaired aesthetic appearance and durability
Proposal AIV For the "Reception areas" of 427m^2, average 900mm moisture resistant gypsum board suspended ceiling was introduced instead of the average 900mm dropped gypsum board suspended ceiling in the initial proposal.	• Functional requirement- achieving strength, stability and moisture resistance • Cost of initial proposal- unit cost of LKR 6844.26 • Cost of alternative- unit cost of LKR 7643.50	• Additional cost- LKR 341275.50 • More strong, stable and moisture resistant
Proposal BI For the roof area of 30m x 40m, the waterproof motorised colour coated retractable roof, made of stainless steel, operated using cold rolled technique in the initial proposal was replaced with a retractable roof of same	• Functional requirement- achieving stability and durability and enhancing aesthetic appearance • Cost of initial proposal- LKR 4,500,000	• Cost saving- LKR 1,260,000 • Ease of installation • Impaired aesthetic appearance but more stable and durable

VM Proposal	Description	Impact
functionality. There was a change of brands and dealer for obtaining the latter option	• Cost of alternative was LKR 3,240,000	
Proposal B**II**		
Instead of a 210 m wide* 250m high crystal chandelier in the Alfresco dining hall in the initial proposal, a chandelier of 200m wide*230m high was proposed. Instead of the crystal chandelier of the initial cost LKR 4,053,918, an alternative brand of chandelier of LKR 3,100,544.60 was proposed for the Grand ballroom	• Functional requirement- enhancing aesthetic appearance • Cost of initial proposal for the Alfresco dining hall- LKR 3,005,893.44 • Cost of alternative- LKR 2,500,218.50 • Cost of initial proposal for the Grand ballroom- LKR 4,053,918 • Cost of alternative -LKR 3,100,544.60	• Original options for the both chandeliers were much larger and could have been difficult to handle if installed • For the chandelier of the Alfresco hall, cost saving was LKR 505, 674.94 and for the Grand ballroom chandelier it saved LKR 953,373.40. Total cost saving was LKR 1,459,048.34.
Proposal B**III**		
Alternative brand for lamps in the American bar, Pool bar and sea spray restaurant was proposed and quantities were 23, 17 and 12 respectively.	• Functional requirement- providing required level of illuminance and enhancing aesthetic appearance • Cost of initial proposal- unit cost of LKR 321,304.50 • Cost of alternative- unit cost of LKR 103,108.33	• Cost saving- for total of 52 lamps was LKR 11, 346, 174.84. • In terms of availability, first option seemed very difficult to be procured • First option distractive in terms of shape of the lamps, because other old architectural features of these restaurants could have been less revealing
Proposal C**I**		
The average 900mm dropped mirror finished plasterboard suspended ceiling for 68m^2 area of the lobby in the initial proposal was replaced with plasterboard suspended mural barrel ceiling with custom print wallpaper	• Functional requirement- enhancing aesthetic appearance • Cost of initial proposal- unit cost of LKR 61817.50 • Cost of alternative- LKR 33401.06.	• Cost saving- LKR 1,932,317.92. • Compared to initial option, alternative option does not need frequent cleaning and maintenance to retain the polished appearance
Proposal C**II**		
For the bathroom in the lobby, the vanity counter unit with a sub framing comprising granite counter top with leather finish in the initial proposal was replaced by not having the leather finish to retain the natural granite counter top	• Functional requirement- durability and enhancing aesthetic appearance by retaining natural appearance • Cost of initial proposal- unit cost of LKR 278901.76. • Cost of alternative- LKR 175680.00.	• Cost saving- LKR 103,221.76 • Initial proposal which had the leather finish was aesthetically appealing. But granite retains the natural appearance and more durable • Less installation time
Proposal C**III**		

VM Proposal	Description	Impact
For the glazed screen in the lobby, 12mm thick sandblasted glass screen of overall size 6655mm x 3000mm was proposed initially and it was replaced with acid etched glass screen with same dimensions. A glazed screen of similar dimension was installed at the kitchen too.	• Functional requirement- durability, less maintenance and enhancing aesthetic appearance • Cost of initial proposal- unit cost of LKR 5552251.62 • Cost of alternative- unit cost LKR 3524688.23	• Cost saving- LKR 2,027,563.42*2, which equals to LKR 4,055,126.84 • Acid-etching creates a distinctive, smooth, satin appearance which can give a true frosted look compared to sandblasted glass. • Acid etching leaves a permanent design which will not peel or chip or wear down over time and tend to be less prone to fingerprints than sandblasted glass. • Acid etched glass has lesser maintenance cost.
Proposal CIV Instead of Atollo table lamp on the either side of the bed in the initial proposal, Bauhaus table lamp was used with the same illuminance to achieve the same function. 2 table lamps were required per one bedroom and altogether 162 lamps were used for the 81 rooms.	• Functional requirement- enhancing aesthetic appearance and maintaining desired illuminance level • Cost of initial proposal- unit cost of LKR 140,498.25 • Cost of alternative-unit cost of LKR 115,008.95	• Cost saving- LKR 4,129,266.60 • The aesthetic appearance and the illuminance levels were not affected due to the change

In Case A, A5 noted; *"Due to the quality enhancement achieved after refurbishment, the average room rate has increased from LKR 20,326 to LKR 21,825".* This was an increment of 7.37%. A5 and A7 claimed that the annual maintenance and operational budget of the hotel has reduced by 8.31% in 2017 for the areas, where VM proposals were employed. Although VM study contributed a delay of 2 to 3 months in the project, A1, A2 and A3.

In Case B, a total cost saving of LKR 14,065,223.18 against a total cost of LKR 147,000,000 total project cost with a saving of 9.57% was achieved from VM proposals. With the improvements, the annual average room rate increased from LKR 18,914 to LKR 20,366, which is a growth by 7.67%. The reduction of 9.16% in the annual operational and maintenance budget was recorded in year 2017 for the areas VM proposals were executed. The VM study had contributed to a time delay of 1 to 2 months, compared to the original project schedule. According to B4, *"There was a*

significant time gap between the post tender and construction, because of the VE workshop". Nevertheless, B1, B2 and B3 pointed out initiating VM in the post tender prevented a much higher time overrun in the overall project schedule, because less design and construction revisions were undertaken due to VM implementation. The time overruns caused by VM study was inevitable due to ad hoc manner of VM application and the inability to plan VM at the outset of the project.

In Case C, the VM proposals achieved a cost saving of LKR 10,617,763.28 against a total cost of 137,800,000, which is 7.71%. The annual operation and maintenance budget for year 2018 has reduced by 11.11% compared to year 2017, for the elements, which applied VM. C6 noted; *"Mostly because of VM proposal I and VM proposal III, reduction in the annual maintenance cost was realised".* With the improvements after refurbishment, the average room rate for 2018 raised from LKR 10,377 to LKR 11,450 per annum and recorded 10.34% increase. Since the VM study had not been planned at the initial stages of the project, VM workshop was implemented unsystematically and it consumed a major share of time. As pointed out by C1, C2 and C4, executing VM solutions had caused a delay of at least 1 1/2 months in the project. However, they further indicated that time overrun of the project could have been at least 03 months of a time delay, if VM proposals were not executed.

The impacts of VM proposals are illustrated in Table 4.11 in terms of cost saving, quality improvement and time overrun of the refurbishment projects.

Table 4.11: The Outcomes of the VM Proposals

Parameter	Case A	Case B	Case C
Cost saving	5.06%	7.67%	7.71%
Reduction in annual operational and maintenance budget	8.31%	9.16%	11.11%
Time overrun of the project	2 to 3 months	1 to 2 months	Approximately 1 1/2 months

Overall, these results indicate that when VM is applied in refurbishment projects, project cost can be reduced on average by 6.81%. When VM is employed in ad-hoc manner, depending on the scope of the project, time overrun of 1 to 3 months can be expected. Nonetheless, there were no evidence to quantify the impacts of the other

value for money attributes; quality, guest satisfaction and achievement of sustainability.

4.8 Challenges for VM Application in Hotel Refurbishment Projects

The respondents pointed out the challenges encountered in applying VM for the case study projects and the code structure is presented in Figure 4.6.

Name	Sources	References
Challenges encountered in implementing value management	18	86
Name	**Sources**	**References**
Lack of awareness of the client about the importance of VM	18	18
Lack of time to conduct VM study while the project is ongoing	18	18
Lack of as- built drawings and building information	13	13
Perceiving VM as a cost cutting technique leading to compromise quality	8	8
Reluctance of design consultants to apply VM	6	6
Lack of prior experience and exposure of project team memebers on VM	5	5
Difficulty in understanding the possible scope for VM	4	4
Lack of resources in the local market restrains application of creative value	4	4
Lack of assistance from regulatory bodies and insufficient legal provisions	4	4
Lack of participation of some project team members in the VM study	3	3
Traditional procurement method limits contractor's VM suggestions	3	3

Figure 4.6: Code Structure for Challenges to Apply VM

The two (02) topmost challenges identified by all the respondents are the lack of awareness of the client about the importance of VM and lack of time to conduct the VM study while the project is ongoing. As derived from the opinions of the respondents, lack of awareness of the client on VM resulted reluctance and lack of interest of the clients vastly because the importance and benefits of VM were unbeknownst to them. C1 highlighted; *"As the client did not know about VM and he thought it was a risk to adopt techniques to revise decisions while the project was on going"*.

Since applying of, it was challengeable to allocate specific time slots for the VM study. B2 noted; *"We were under a tight schedule to complete the project and apparently we did not have a pre assigned time slot for VM".*

For a successful VM study, availability of information has a high contribution. However, lack of as-built drawings and building information constrained the formulation of creative and precise decisions. According to A4, *"When we wanted to*

revise some decisions for improving value regarding service installations, finding site data and drawings was challenging".

Perceiving VM as a cost cutting technique leading to compromise quality was another barrier. C2 admitted; *I think we judged VM to be cost cutting and we had to prioritise cost reduction over quality improvement when using VM".*

Six respondents noted that reluctance of design consultants to apply VM was evident and it constrained the generation of creative design alternatives to the original design proposals. C4 explained; *"Designers had the fear of applying VM due to different alternatives causing harm to original design ideas".*

Among the other challenges, lack of prior experience and exposure of project team members on VM was also significant, because making the personnel who had no prior experience in VM aware and educated about VM consumed time. B2 noted*; "Before initiating the VM study, we had to educate them too spending some extra time and their judgements were clashing with ours since they failed to see the practical aspects of VM".*

As pointed out by four respondents, difficulty in understanding the possible scope for VM led to confusions and unnecessary delays in the VM study. Moreover, lack of resources in the local market restrained the application of creative value enhancing options. C4 stated; *"Although we came up with alternatives for frosted glass installation through value study, we had to take it back as the materials were not available in the local market and procuring them from foreign companies could have consumed extra cost and time".*

Lack of assistance from regulatory bodies and insufficient legal provisions was a challenge highlighted by four respondents. In Case C, application of VM for that project was initiated by the contractor and it was realised that the formation of contract by incorporating VM proposals was vaguely instructed in the SBD. C4 further argued; *"There are no provisions made by regulatory bodies on tax incentives for us even though we implement VM in projects".*

Lack of participation of some team members in the VM study was also expressed as a challenge, because ideas from all the VM team members were perceived as important for devising VM proposals. For Case A, A7 noted; *"Even though the interior designer and the kitche*n *and laundry consultant were included in the VM team from its commencement, the lack of participation of those foreign companies was evident".* All the contractors, who responded argued that contractor's role could have been more beneficial in the VM study, if they had joined the project during the early stage, when the design proposals were at the development stage. However, the traditional procurement method limited contractor's participation and they could only suggest alternatives to already developed design proposals rather than coming up with new ideas. A4 explained; *"Lacking of contractor's participation in the design stage related VM proposals development due to traditional procurement method was challenging"*

In order to overcome aforementioned challenges, certain measures were adopted by the case study projects.

4.9 Measures for VM Application in Hotel Refurbishment Projects

The measures adopted by the respondents to overcome the aforementioned challenges are illustrated in the code structure of Figure 4.7.

Name	Sources	References
Current practices to overcome challenges in implementing value management	18	83

Name	Sources	References
Convincing the importance and benefits of VM to the client	18	18
VM workshops are conducted simultaneous to project meetings	13	13
Online and verbal communication facilitate communication and coordination	10	10
Revisiting the design alternatives during the construction stage for value enhancement opportunities	9	9
Discussing possible areas of value enhancement with the client and project team	8	8
Information from preliminary site survey and mock up refurbishment are collected	7	7
Making entire project team aware of VM process before the VM study	7	7
Exploring options to derive materials from the local market	6	6
Parties to the project negotiate their own terms and conditions for executing VM	5	5

Figure 4.7: Code Structure for Measures Adopted

Lack of awareness of the client about VM was the major hurdle. Hence convincing about the benefits and importance of VM to the client encouraged him to approve the application of VM in this project. He was interested in knowing about cost reduction approaches for the project. Discussing possible areas of value enhancement with the

client and the project team and making the project team aware of VM before the VM study contributed to raise the awareness of the client. According to A1, "*Since client was interested on cost cutting strategies, the importance of VM in terms of a cost cutting exercise was convinced to the client while convincing him about the other benefits such as quality improvements"*.

Since lack of time to conduct the VM workshop was also challenging, the project team conducted the VM workshop simultaneous to project meetings. B1 confirmed; "*Project manager and cost consultant coordinated with the other project team members and organised VM workshops in the hotel premises simultaneous to scheduled project meetings".*

Lack of participation of some team members was evident, because some members had an inconsistent participation in the VM workshop. However, knowledge sharing and analysing the proposals generated at the VM workshop had to be analysed as a team. In order to enable it, strategies such as online communication platforms, virtual meetings and verbal communication means were adhered. As pointed out by A7, "*With the help of virtual meeting environment which used online conferencing and cloud storage, we could overcome communication barriers".*

Even though the contractor opined that the traditional procurement method restrained the involvement of the contractor in the project initial stages to generate more effective VM proposals, 50% of the respondents claimed that revisiting the design alternatives during the construction stage was enabled. In addition, discussing possible areas of value enhancement with the client and the project team was also useful. A4 explained; "*Initial mock ups at the tender stage helped in gaining the big picture, while revisiting the design alternatives during the construction stage"*.

Hence, the contractor could present his ideas when refining design decisions to devise VM proposals. The VM workshop was constrained due to difficulty in understanding the possible scope for VM. Discussion of possible areas of value enhancement with the client and the project team assisted in clarifying a scope for the VM study. B2 explained the means adopted to solve the issue as; *"Informing the client about the*

possible areas of value enhancing opportunities and only sticking with them was effective".

Moreover, the design consultants were instructed to analyse design alternatives in terms of functionality, was also avoided. Discussion of possible areas of value enhancement with the client and making the project team aware of VM before the VM study were also crucial because the project team gained knowledge about VM. A3 was of the view; *"All the alternatives were carefully evaluated in terms of functional requirement achieving criteria, but with a focus on cost while maintaining quality".*

In order to overcome the challenges encountered due to lack of information, as pointed out by seven (07) respondents, information gathered from the site survey and mock up refurbishment were used to update drawings with revisions, while construction activities were on going. Since there were VM team members, who had no prior experience in VM, they were made aware of VM by convincing them about the importance and benefits through a brainstorming session conducted by the cost consultant, who led the VM study as the VM facilitator.

Lack of resources in the local market was a barrier for successful implementation of VM. However, six (06) respondents explained as to how they could overcome such barriers. According to C4; "*We tried finding materials which could derive the same functionality from the local market, this gave us the opportunity to explore more options".* Exploring options to derive materials from the local market was the strategy they adopted. Although lack of assistance from regulatory bodies and insufficient legal provisions were challengeable, parties to the project negotiated their own terms and conditions for executing VM study. C2 emphasised; *"We decided to negotiate terms and conditions on executing VM and sharing profits as well as losses".*

Although the measures adopted by the VM team to overcome the challenges that they encountered when applying VM led to generate effective VM proposals, VM was applied in an ad-hoc manner. Hence, all the respondents opined that the full benefits of VM can be realised by devising strategies to enhance VM application.

4.10 Strategies to Enhance VM application in Hotel Refurbishment Projects

Although the challenges emerged during the application of VM in hotel refurbishment projects in Sri Lanka could be overcome by applying certain measures, VM was employed in an ad-hoc manner. Hence, it was required to determine the strategies to enhance VM application in hotel refurbishment projects in Sri Lanka. The opinions of the respondents were summarised in to five (05) key strategies and further the responsible parties to implement the strategies were identified.

i. Raising Awareness, Training and Development on VM

When asked how awareness on VM should be raised among the professionals, who involve in refurbishment projects, the most significant strategy, endorsed by all the respondents is enabling of formal education opportunities on VM. A1 suggested; "*Enabling formal education opportunities such as short courses and continuous professional development on VM through professional institutions and universities".*

The focus group to which these education opportunities need to be made available as Architecture, Quantity Surveying, Engineering and Facility Management undergraduates or professional at the industry level. It was further suggested to train VM facilitators, at least one for each cost consultancy or contractor organisations. Learning from success stories and good practices of VM application is another strategy proposed. Accordingly, the Construction Organisations, Construction Authorities and Regulation Bodies and Higher Education, Research and Development Institutions were recognised as the responsible parties to implement the strategy.

ii. Enabling Legal Provisions and Assistance from Regulatory Bodies

Answering as to how VM process in refurbishment projects should be standardised, all the respondents indicated that VM process should be enabled with adequate legal provisions and assistance from regulatory bodies. The 50% of the respondents suggested to update the SBD with clauses about VM on fee for conducting VM in accordance with the contract price. Moreover, sharing VM cost savings in accordance with the project cost savings should also be clearly defined in SBD. Among the other suggestions, CIDA should provide tax incentives to projects which implement VM and

standardising VM facilitation services through legal provisions are also highlighted. The responsibility lies on Construction Authorities and Regulation Bodies.

iii. Choosing the Right Timeframe to Apply VM

Answering the question, "what is the timeframe to apply VM to refurbishment projects?", all the respondents highlighted the need of planning ahead of the project to apply VM, mainly because VM exercise consumes time and difficult to incorporate during the latter stages, if it is not well planned. This pre planning enables devising the VM workshop program. It is appropriate to conduct the VM workshop at the building premises, because site conditions can be closely observed. Moreover, a VM workshop can be executed for three to four consecutive days with a duration of five to six hours per day and project meeting schedule should be adjusted accordingly. A1 supported this view; *"I think it's better to conduct the workshop inside the building and it could run up to 3 or 4 days with 5 to 6 hours' duration per day".*

The respondents recommended to initiate VM in the concept design stage and conduct a VM workshop in the construction stage as well. According to the respondents, a refurbishment project should at least have two VM workshops. First VM workshop at the concept design stage helps to plan the time slots, venue and program for the value study and discuss the design alternatives. However, if traditional procurement method is adopted, contractor cannot participate in the first VM workshop. Since the existing building can pose unanticipated conditions after demolition and construction works are initiated by the contractor, he can still contribute for value enhancement during the second workshop by revisiting original design solutions. In fact, it should be noted that respondents recommended to use traditional procurement for refurbishment projects, as the clients are reluctant to pass the risk of unanticipated conditions in the existing building to the contractor. The VM team is responsible for choosing the right timeframe for applying VM.

iv. Choosing the Right Composition for the VM Team

Respondents were requested to suggest the suitable composition for the VM team. All of them highlighted employing the building maintenance personnel in the VM study, because getting the involvement of the maintenance engineer or facility manager in

the VM process of the refurbishment project would be beneficial, as they know about building conditions well. Employing a VM facilitator to coordinate the VM study was also indicated. Some respondents recommended to hire an external personnel, instead of employing a member from the project team. Hiring an external VM facilitator, who has prior experience can give his independent opinions since he is an external to the project team. Conversely, some respondents asserted that employing the cost consultant as the VM facilitator is more suitable. A1 stated*; "Cost consultant knows about the project and he won't charge an extra fee like an external expert".*

Some other respondents indicated that choosing the VM facilitator should be a choice made by the client. By summarising their opinions, the composition of the VM team was derived as follows.

- Project Manager
- Client or a representative of the client
- Lead designer or architect
- Main contractor
- Maintenance manager or facility manager of the building
- Cost consultant as the VM facilitator or hiring an external VM facilitator, while cost consultant is still on the VM team

Therefore, the ideal VM team should comprise of six to seven members from the project team.

v. Choosing the Right VM Job Plan

When inquired about the suitable VM job plan to be followed in the refurbishment projects, respondents of Cases A and C indicated that the SAVE 40-hour job plan is more suitable. The respondents of Case B recommended SAVE 40-hour job plan as well as contractor's change proposal. B2 pointed out; *"Contractors can provide better insights to construction and engineering solutions in refurbishment projects and at the end of the day cost is the main concern"*

Their opinions were used to derive the VM process to be followed in the pre workshop, workshop and post workshop stages. Nevertheless, as mentioned earlier, respondents

recommended to conduct the VM workshop for a maximum of four (04) days with a maximum of 6 hours per day, which would add up to only 24 hours, not 40 hours, as stated in SAVE 40-hour job plan. It was evident from the comments of respondents that they did not place much significance on VM tools and techniques to use in each VM phase. This is because, in the Sri Lankan construction industry context, only the convenient methods, which aid the decision making in each VM phase are used. The VM process recommended by the respondents along with the VM tools are summarised in Table 4.12.

Table 4.12: Choosing the Right VM Job Plan

VM workshop stage	Main tasks	VM tools
Pre workshop stage	• Forming the VM team • Defining the scope and objectives of the VM study	Brainstorming
Workshop Stage		
I. **Information Phase**	• Gathering information such as details of recently completed projects of similar scope, as built drawings, initial design proposals and the bill of quantities, contractors proposals, problems identified during the preliminary site survey and mock up refurbishment	Brainstorming
II. **Function Analysis Phase**	• Determining the value enhancing opportunities, required functions related to them • Eliminating the unnecessary functions within the scope using functional analysis	FAST diagram or functional analysis
III. **Creativity Phase**	• Developing various design and construction options for performing each value enhancing opportunity	brainstorming
IV. **Evaluation and Development phase**	• Analysing alternatives identified in the preceding phase against different parameters • selecting the best alternative	LCC and cost benefit analysis

VM workshop stage	Main tasks	VM tools
V. **Presentation Phase**	• Converting the selected best alternatives in to written recommendations • Devising an action plan for implementation	Summary Reports, Action plan
Post workshop stage	• Conducting a follow-up session to ensure that all the VM proposals were executed and desired outcomes were achieved • This post workshop should be conducted shortly before the handover of the project to the client	

The VM team is responsible for choosing the right VM job plan.

4.11 Benefits of Successful VM Application in Hotel Refurbishment Projects

The benefits, which can be derived by successfully applying VM in hotel refurbishment projects were captured from respondent's opinions. These opinions were categorised in terms of the benefits under value for money attributes; cost, quality, time, guest satisfaction and sustainability.

Table 4.13: Benefits of Successful VM Application

Value for money attributes	Benefits
Cost	• Creative VM proposals can suggest alternative material, equipment and methods, which deliver value for money in both short and long run • VM proposals can conduct a detailed repositioning exercise to, evaluate price vs. value equation at the design stage and determine the return on investment of the refurbishment which generate benefits from the whole life cycle perspective • Assessing the market demand to set higher pricing levels for guest rooms and ballrooms, when formulating VM proposals
Time	• VM proposals can provide material, equipment and methods, which are installed or constructed with less time • Improving partial or staggered refurbishment through stage by stage VM proposals
Quality	• Introducing economical, yet high quality alternative material and equipment through VM proposals • Warranting reclassification of guest rooms to rethink customer positioning through VM proposals

Value for money attributes	Benefits
	• Innovative VM alternatives can preserve elements with architectural and archeological value, which in turn uplift the socio cultural quality of historic and old hotel buildings
Guest Satisfaction	• Technical solutions can produce systematic isolation strategies causing minimum disruptions to occupied guest rooms • Prioritising critical areas such as lobby, restaurants, bars and swimming pools through VM proposals
Sustainability	• Generating lighting and air conditioning solutions with energy saving and sustainable alternatives • Use of green building material alternatives, with low carbon emissions • Reducing demolition waste by enabling re use of material through VM proposals • VM proposals can introduce material and equipment, which are reusable or recyclable

The enhanced VM application is beneficial since it can contribute in overcoming the challenges in hotel refurbishment projects. For example, hotels cannot afford time overruns, since the hotel owners are reluctant to shut down the hotel and thus refurbishment is done simultaneous to operations. The VM proposals can be well planned and analysed to provide systematic isolation strategies, by prioritising critical areas. This will in turn provide opportunity to complete refurbishment in such critical areas within the pre-determined scope, time and budget with minimal disruptions to the guests.

The findings derived from the three (03) case studies were summarised for validation by subject matter experts.

4.12 Validation of Research Findings

In order to verify the findings of the data analysis, a summary of the findings was presented to three (03) subject matter experts. The profile of the experts, who validated the research findings is summarised in the following Table 4.13. Their constructive feedback was used to develop the framework for enhancing VM application in hotel refurbishment projects in Sri Lanka.

Table 4.14: Profile of the Validators

Name of the expert	Description about expertise
E1	General Manager of the project management division of a reputed property development company. He has over 40 years of work experience in the construction industry. He is a charted quantity surveyor and a charted facility manager, who has more than 25 years of experience in application of VM in local and international construction projects.
E2	Managing Director in a cost consultancy firm. He has over 35 years of work experience in the construction industry. He is a charted quantity surveyor, who has more than 25 years of experience in applying VM in local and international construction projects.
E3	Head of Construction and Engineering attached to a reputed Grade 1 Contractor in Sri Lanka. He has over 30 years of work experience in the construction industry. He is a charted engineer who has more than 15 years of experience in applying VM in local construction projects.

E1 commented on the research findings and verified them. He recommended not to specify a name of a standard VM job plan. Moreover, he was of the view that use of terminology "right VM team" and "right timeframe for VM" should be avoided and replace them with "appropriate VM team" and "appropriate timeframe for VM" respectively. E2 was satisfied with research findings and validated them. He also advised not to use the terminology "VM job plan" in the framework and furthermore opined not to specify names of VM job plans such as "SAVE 40-hour". Instead, he suggested to use the terminology, "VM process" or "phases in a VM workshop". E3 highlighted that Clause 13.2 of the SBD for procurements of Works – Major Contracts (2007) as well as the SBD for procurements of Works – Design and Build Contracts (2003) imply about VM. Hence he argued that some legal provisions have already been enacted. His suggestion was to indicate that such legal provisions need to be revised and updated. With the guidance provided by the experts, the first two (02) strategies were classified to be borne by the external parties, while the last three (03) strategies to be borne by the VM team.

4.13 The Summary of the Research Findings

The summary of the research findings in terms of the challenges in hotel refurbishment projects in Sri Lanka, the challenges and existing solutions provided during the VM application in hotel refurbishment projects in Sri Lanka. The ways of enhancing VM

application in hotel refurbishment in Sri Lanka and benefits that can be obtained from successful application are also summarised in Figure 4.8.

4.14 The Framework to Enhance the VM Application in Hotel Refurbishment Projects in Sri Lanka

The framework for enhancing VM application in hotel refurbishment projects was developed including the comments of case study respondents and validators as illustrated in Figure 4.9. It incorporates the This framework highlights the potential benefits that could be yielded through successful VM application in terms of the value for money attributes; cost, time, quality, guest satisfaction and sustainability.

Challenges in Hotel Refurbishment Projects in Sri Lanka

- Budget overruns due to superficial designs and construction activities
- Time overruns due to refining designs to cater unanticipated building conditions
- Limitations to introduce changes to existing building structures
- Interruptions to building occupants due to simultaneous operations
- Lack of as-built drawings and site information
- The difficulty of reusing existing materials and equipment due to damages and non suitability
- Lack of coordination and communication of project participants
- Lack of secured places in the site to store construction equipment
- Insufficient safety precautions on site
- Lack of standardised testing and commissioning of the building services and equipment
- Traditional procurement method restrains the contractor's input to design alternatives
- Inadequate identification of client's requirements
- Absence of a proper isolation strategy to systematically assign the areas in the building for the refurbishment, while the other areas are in operation
- Lack of supervision
- Existing buildings are subjected to legislative constraints

Challenges to Apply VM in Hotel Refurbishment Projects

- Lack of time to conduct VM study while the project is ongoing
- Lack of awareness of the client about the importance of VM
- Lack of as-built drawings and building information
- Lack of prior experience and exposure of project team members on VM
- Reluctance of design consultants to apply VM
- Perceiving VM as a cost cutting technique leading to compromise quality
- Difficulty in understanding the possible scope for VM
- Lack of participation of some project team members in the VM study
- Traditional procurement method limits contractor's VM suggestions
- Lack of resources in the local market restrains application of creative value enhancing alternatives
- Lack of assistance from regulatory bodies and insufficient legal provisions

Existing Solutions to VM Application in Hotel Refurbishment Projects

- Convincing the benefits and importance of VM to the client
- Conducting VM workshops simultaneous to project meetings
- Facilitating coordination via online platforms
- Revisiting the design alternatives during the construction stage
- Discussing possible areas of value enhancement with the client and the project team
- Collecting information from site surveys and mock up refurbishment
- Making the project team aware of VM before the VM study
- Exploring options to derive materials from the local market
- Parties to the project negotiated their own terms and conditions for executing VM study

How to Enhance VM Application?

Raising awareness, training and development on VM

Choosing the appropriate timeframe to apply VM

Adopting the appropriate VM Job Plan

Choosing the appropriate composition for the VM team

Enabling legal provisions and assistance from regulatory bodies

Benefits of Successful VM Application

Cost

- Creative VM proposals can suggest alternative material, equipment and methods, which deliver value for money in both short and long run
- VM proposals can conduct a detailed repositioning exercise to, evaluate price vs. value equation at the design stage and determine the return on investment of the refurbishment
- Assessing the market demand to set higher pricing levels for guest rooms and ballrooms, when formulating VM proposals

Time

- VM proposals can provide material, equipment and methods, which are installed or constructed with less time
- Improving partial or staggered refurbishment through stage by stage VM proposals

Quality

- Introducing economical, yet high quality alternative material and equipment through VM proposals
- Warranting reclassification of guest rooms to rethink customer positioning through VM proposals
- Innovative VM alternatives can preserve elements with architectural and archeological value by carefully planned modifications and replicas

Guest Satisfaction

- Technical solutions can produce systematic isolation strategies causing minimum disruptions to occupied guest rooms
- Prioritising critical areas such as lobby, restaurants, bars and swimming pools through VM proposals

Sustainability

- Generating lighting and air conditioning solutions with energy saving and sustainable alternatives
- Use of green building material alternatives, with low carbon emissions
- Reducing demolition waste by enabling re use of material through VM proposals
- VM proposals can introduce material and equipment, which are reusable or recycleble

Figure 4.8: The Summary of Research Findings

Framework to Enhance Value Management Application in Hotel Refurbishment Projects in Sri Lanka

Responsible External Parties

Construction Organisations
Construction Authorities and Regulation Bodies
Higher Education, Research and Development Institutions

Raising awareness, training and development on VM in the construction industry

- Enabling opportunities such as short courses, CPD on VM application in refurbishment projects
- Inclusion into degree curriculum
- Focusing such opportunities mostly on QS, FM, civil engineering undergraduates and professionals
- Training VM facilitators, at least one for each consultancy or contractor organisations
- Learning from good practices of VM application in refurbishment projects

Enabling legal provisions and assistance from regulatory bodies

- Updating SBD with clauses for conducting VM study in refurbishment projects and sharing VM cost savings
- Providing incentives to projects which implement VM
- Standardising VM facilitation services through legal provisions

Responsible Internal Parties

Value Management Team

Choosing the appropriate timeframe to apply VM

- Planning ahead of the project to apply VM mainly focusing on educating the participants
- Conducting at least 2 VM workshops by initiating VM in concept design stage and in demolition and construction stage
- Conducting the VM workshop at the building premises for at least 2 to 3 consecutive days and 5 to 6 hours per day

Choosing the appropriate composition for the VM team

- VM team should comprise of a minimum of 6 to 7 members from the project team
- Members of VM Team: *Project manager, client or client's representative, main contractor, lead designer or architect, maintenance manager or facility manager of the building, cost consultant as the VM facilitator or hiring an external VM facilitator, while cost consultant is still on the VM team*

Adopting the appropriate VM Job Plan

Pre workshop stage
Forming the VM team and defining scope and objectives of VM study

Workshop stage
I Information Phase- Gathering information; *VM tools: Brainstorming*
II Function Analysis Phase- Determining required functions and eliminating unnecessary functions; *VM tools: FAST, Functional Analysis*
III Creativity Phase- Developing alternatives; *VM tools: Brainstorming*
IV Evaluation and Development Phase- Analysing alternatives against chosen parameters and selecting the best alternative; *VM tools: LCC, Cost Benefit Analysis*
V Presentation Phase- Converting best alternatives in to written recommendations and devising an action plan for implementation; *VM tools: Summary Reports, Action plan*

Post workshop stage
Conducting a follow-up session to ensure that all the VM proposals were executed as planned and ensuring desired outcomes were achieved

Figure 4.9: Framework to Enhance VM Application in Hotel Refurbishment Projects in Sri Lanka

4.15 Discussion of the Research Findings

The research findings of the present study were compared with the existing literature.

4.15.1 Building Refurbishment projects

The present study offered certain insights to building refurbishment projects. A definition for the terminology, "refurbishment", was generated and it was encapsulated that refurbishment encompasses renovation, retrofitting, repairing, restoration and extension to the existing building to deliver the expected functionality with better performance and it is primarily focussed on upgrading and modifying the building. This corroborated the interpretations of Egbu et al. (2002) and Rahmat and Ali (2010) on refurbishment. The past studies on refurbishment did not specify the appropriate time period to undertake a refurbishment project. Hence the time for refurbishment was perceived to be vary between zero for immediate change of use to the design life (CIRIA Report, 1994). The current study, which focussed on hotel building refurbishment projects, revealed that refurbishment is done within 10 to 15 years after the commencement of building operations.

The mainstream literature does not provide any guideline on the stages of a refurbishment project. The RIBA plan of work is not appropriate for refurbishment projects, because of the un matching patterns in refurbishment and new builds (Ali et al., 2008). Reflecting the findings from the current research, which have adopted traditional procurement method, the stages and activities of a refurbishment project can be compressed in to six (06) stages, as project initiation and briefing, concept design, technical design, tender stage, demolition and construction and project handover and closeout stage. The refurbishment team comprises of the client or the decision makers, building users, the design team with specialist consultants, architects, engineers and quantity surveyors, the construction team with the general contractor, management contractor, specialist sub-contractors and suppliers (CIRIA Report, 2004). The findings derived from this study, which focussed on hotel refurbishment projects in Sri Lanka mirrored those of the previous studies and identified the client or his representative, project manager, cost consultants, designers, engineers, contractors and maintenance manager or facility manager to be in the refurbishment team.

4.15.2 Challenges in Refurbishment Projects

The present study identified fifteen (15) challenges attributed hotel refurbishment projects in Sri Lanka, that were broadly classified as challenges due to existing buildings and challenges due to project team. The top most challenges attributed to hotel refurbishment projects, are derived from the current study. Lack of as built drawings and site information, lack of secured places in the site to store construction equipment, lack of coordination and communication of project participants, lack of supervision, insufficient safety precautions on site, the difficulty of reusing existing material and equipment due to damages and non-suitability, inadequate identification of client's requirements and existing buildings are subjected to legislative constraints are the other challenges. The studies such as Ali and Au-Yong (2013); Arain (2005) and Lund et al. (2016) revealed the aforementioned challenges as challenges attributed to building refurbishment projects. The present study indicated that in Sri Lanka, hotels cannot afford shutting down operations entirely and thus refurbishing is mostly done simultaneous to operations. Therefore, causing disruptions to hotel guests and hotel staff and preserving hotel buildings with archeological and architectural values with limited alterations are the two (02) main concerns of the project team. These two (02) concerns are reflected in the findings related to challenges in hotel refurbishment projects and also the studies such as Ali and Au-Yong (2013) and Arain (2005) reported limitations to introduce changes to existing structure and simultaneous operations by owner constraining the full possession of the building as two (02) challenges attributed to building refurbishment projects.

In addition, lack of standardised testing and commissioning of the building services and equipment, traditional procurement method restrained the contractor's input to design alternatives and absence of a proper isolation strategy to systematically assign the areas in the building for the refurbishment, while the other areas are in operation simultaneously were also identified as challenges in hotel refurbishment projects in Sri Lanka from the case study projects of the current research.

4.15.3 Application of VM in Refurbishment Projects

The present study proved that all the challenges attributed to hotel refurbishment projects lead to subvert value for money. In the current study, value for money in hotel refurbishment projects was attributed to cost, time, quality, guest satisfaction and sustainability. Among the other value enhancing techniques, VM is acknowledged as an effective method to achieve value for money in construction projects (Shen & Yu, 2016; Yu et al., 2006). Findings of the present study have corroborated the above notion, since the need for VM was triggered as an approach to deliver value for money in refurbishment projects. A very few instances of probing the application of VM in refurbishment projects is evident in the mainstream literature. The study of Witschey and Wulff (1998) on the application of VE in the renovation project of the Science Museum of Virginia in 1997 and the study of Short et al. (2007) on the application of VE in five capital arts projects are among the few examples. In both studies, VM was applied as a cost cutting technique and it was employed in an ad-hoc manner. Similar findings were derived from the present study, in which VM was employed in three (03) refurbished hotel projects and the terminologies VM and VE were used alternatively. The VM workshops of case study projects, which were conducted in an ad-hoc manner had no additional costs incurred for the VM study. According to Olawumi et al. (2016), a well-planned VM study should yield 10-15% savings of total project costs, while the cost of VM study lies at approximately 0.3% to 0.5% of the project cost (Daddow & Skitmore, 2005). Overall, the findings of the present study stated that when VM is applied in refurbishment projects, project cost can be reduced on average by 6.81%. When VM is employed in ad hoc manner, depending on the scope of the project, time overrun of 1 to 3 months can be expected. Nonetheless, there were no evidence to quantify the impacts of the other value for money attributes; quality, guest satisfaction and achievement of sustainability.

4.15.4 Challenges and Solutions for VM Application in Refurbishment Projects

The literature findings reflected that application of VM in construction projects encounter numerous challenges in different countries. In general, as pointed out by Kelly and Male (1993), application of VM in construction projects is time-consuming. Moreover, Oke and Aigbavboa (2017) claimed that lack of experience and knowledge of the clients and lead consultants on VM is a barrier. Corroborating literature findings, the two (02) topmost challenges to apply VM in hotel refurbishment projects in Sri Lanka as derived from the present study are the lack of awareness of the client about the importance of VM and lack of time to conduct the VM study while the project is ongoing. Among the other challenges, lack of information and as built drawings of the building to be refurbished, perceiving VM a cost cutting technique leading to compromise quality and lack of prior experience and exposure of project team members on VM are also significant. Although certain measures were practiced to overcome the challenges, this study revealed that such measures only lead to ad-hoc application of VM. The studies of Bandara et al. (2018) and Madushika et al. (2018) also proved that VM is currently practised in Sri Lankan construction projects in an ad-hoc manner.

4.15.5 Strategies to Enhance VM Application in Refurbishment Projects

Lin and Shen (2006) revealed that VM studies in construction projects are constrained due to the lack of rigorous models and frameworks. Hence the current study introduced a framework to enhance VM application focussing on hotel refurbishment projects in Sri Lanka by incorporating strategies on raising awareness, training and development on VM, choosing the appropriate timeframe to apply VM, choosing the appropriate composition for the VM team, choosing the appropriate VM job plan and enabling legal provisions and assistance from regulatory bodies.

Enabling of formal education opportunities on VM and focussing them on quantity surveying, civil engineering and facility management undergraduates or professional at the industry level is a strategy to raise awareness, promote the importance and benefits of VM among project teams. The composition of VM team as suggested by Shen and Yu (2016) can be project manager, client representative, design team,

contractors, end users and VM facilitators. Witschey and Wulff (1998) stated that a team consisting of five (05) to seven (07) persons with the relevant expertise with the inclusion of facility manager for the VE study. Short et al. (2007) also added that VE team was a collaboration of the consultants and the contractors in refurbishment projects. In line with the past studies, this study suggested to employ project manager, client or a representative of the client, lead designer or architect, main contractor, maintenance manager or facility manager of the building, cost consultant as the VM facilitator or hire an external VM facilitator, while cost consultant is still on the VM team as the best composition of VM team.

The selected procurement route has a significant impact, when deciding the timeframe to apply VM to a construction project (Kelly & Male, 2003). It was revealed from the present study that traditional procurement method is more suitable for hotel refurbishment projects, as the clients are reluctant to pass the risk of unanticipated conditions in the existing building to the contractor. The past researchers have suggested to apply VM to construction projects at the initial stages such as inception and design (Coetzee 2009; Ilayaraja & Eqyaabal 2015; Shen & Yu 2016). However, their claims have focussed on new building construction projects. Although the later application of VE has high incurrence of costs and less acceptance of VE proposals, VE can be employed at any stage of the project from its inception to its development and during construction stage (Dallas, 2008; Ilayaraja & Eqyaabal, 2015). As per the findings of the present study, the existing building can pose unanticipated conditions after demolition and construction works are initiated by the contractor and revisiting of original design solutions is mandatory. This study revealed that VM should be should be employed in hotel refurbishment projects in the concept design stage to execute a well-planned and structured VM study. Moreover, at least another VM workshop should be conducted during the demolition and construction stage.

As per the mainstream literature, VM job plan is in the forms of SAVE 40-hour job plan, contractor's change proposal, charette, truncated workshop, concurrent study and VE audit (Kelly et al., 2004; Shen & Yu 2016). The present case study projects have used SAVE 40-hour job plan and contractor’s change proposal. As per the findings of the present study, VM process in hotel refurbishment projects should be of pre

workshop stage followed by the workshop stage with information, function analysis, creativity, evaluation and development and presentation phases. Then the Post workshop stage to implement VM proposals and follow up their execution should be undertaken. Karunasena and Gamage (2017) and Perera et al. (2003) pointed out the absence of regulatory provisions to implement VM in Sri Lankan construction projects. The present study showed that VM process should be enabled with adequate legal provisions and assistance from regulatory bodies to enhance VM application s in hotel refurbishment projects, when applied to the Sri Lankan context.

In line with the mainstream literature, this research found that full benefits of VM can be realised by devising strategies to enhance VM application.

4.16 Summary

This chapter initially focused on analysing the current status of hotel refurbishment projects in Sri Lanka. Thereby, the challenges in in these projects were identified. Achieving value for money in refurbishment projects by overcoming the challenges was emphasised and it was found that VM was applied in an ad-hoc manner. The ad-hoc manner of VM application was due to the challenges and thus measures for overcoming these challenges adopted in the case study projects were also identified. Based on the findings, a framework to enhance VM application focussing on hotel refurbishment projects in Sri Lanka were introduced. It encompasses strategies on raising awareness, training and development on VM, choosing the appropriate timeframe to apply VM, choosing the appropriate composition for the VM team, choosing the appropriate VM job plan and enabling legal provisions and assistance from regulatory bodies.

CHAPTER 05

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the overview and the conclusions drawn from the research and describes the contribution of this research to knowledge. This chapter further discusses about the limitations of this study. Finally, recommendations to academic researchers and industry practitioners are provided

5.2 Overview of the Research and Conclusions Drawn from the Study

The present study revealed that the refurbishment projects in Sri Lanka are predominant in hotel buildings. A definition for the terminology, "refurbishment", was derived and it is primarily focussed on upgrading and modifying the building. This study indicated that refurbishment is done within 10 to 15 years after the commencement of building operations. For the projects, which employ traditional procurement method, the stages and activities of a refurbishment can be compressed in to six (06) stages, as project initiation and briefing, concept design, technical design, tender stage, demolition and construction and project handover and closeout stage. Furthermore, the study indicated that client or his representative, project manager, cost consultants, designers, engineers, contractors and maintenance manager or facility manager should be in the refurbishment team.

It can be concluded that compared to other types of building refurbishment projects, hotel refurbishment projects are unique, primarily because hotels cannot afford shutting down operations entirely and thus refurbishing is mostly done simultaneous to operations. Avoiding disruptions to hotel guests and preserving archaeological and architectural values in the building with limited alterations are the two (02) concerns. The current study identified only five (05) attributes of value for money i.e. cost, time, quality, guest satisfaction and sustainability.

In conclusion, VM is still applied in an ad-hoc manner in refurbishment projects, primarily as a cost reduction exercise. The VM workshops are mainly derived from the standard SAVE 40-hour job plan and contractors change proposal. Moreover, the

cost consultant is employed as the VM facilitator, due to the absence of CVS in Sri Lanka. The ad-hoc application of VM reported direct cost savings on average as 6.81%. Approximately a time delay of 1 to 3 months in the project can be expected from an ad-hoc VM study. The two (02) topmost challenges to apply VM in refurbishment projects are the lack of awareness of the client about the importance of VM and lack of time to conduct the VM study while the project is ongoing. These challenges could be overcome by adopting solutions devised by the project team. However, the study concluded that full benefits of VM in hotel refurbishment projects can be realised by devising strategies to enhance VM application.

A framework for enhancing VM application in hotel refurbishment projects in Sri Lanka was introduced. However, these strategies can be employed in any type of refurbishment project. Enabling of formal education opportunities on VM and focussing them on quantity surveying, civil engineering and facility management undergraduates or professional at the industry level is a strategy to raise awareness on VM. Moreover, this study suggested to employ project manager, client or a representative of the client, lead designer or architect, main contractor, maintenance manager or facility manager, cost consultant as the VM facilitator or hire an external VM facilitator, while cost consultant is still on the VM team as the best composition of VM team. VM process should comprise of pre workshop stage followed by the workshop stage with information, function analysis, creativity, evaluation and development and presentation phases. Then the Post workshop stage to implement VM proposals and follow up their execution should be undertaken. VM process must be enabled with adequate legal provisions and assistance from regulatory bodies. Aforementioned strategies can be used to enhance VM application in refurbishment projects. Potential benefits of VM application have been considered in terms of cost, quality, time, guest satisfaction and sustainability.

5.3 Contribution to the Knowledge

The present study makes several noteworthy contributions to the existing body of knowledge as follows:

1. Determining the stages and activities in a refurbishment project, which is traditionally procured
2. Investigating challenges in hotel refurbishment projects in Sri Lanka
3. Exploring the attributes for value for money in hotel refurbishment projects in Sri Lanka
4. Investigating the application of VM in hotel refurbishment projects in Sri Lanka
5. Determining the challenges to apply VM in hotel refurbishment projects in Sri Lanka
6. Investigating the benefits of ad-hoc application of VM in hotel refurbishment projects in Sri Lanka
7. Incorporating the strategies to enhance VM application in hotel refurbishment projects in Sri Lanka and understanding the potential benefits

5.4 Limitations of the Study

The findings of this study are subjected certain limitations. The scope of the current study was confined to hotel building refurbishment projects, because in the Sri Lankan context, the refurbishment projects, which have employed VM were found from the hotel sector. As a result, only three (03) case studies were considered. In addition, all the case study projects were traditionally procured with re-measurement contract. Another limitation to this study is that none of the projects have employed a CVS in their VM study and the VM studies were undertaken during the post contract stage of the projects. Among the other limitations, it should be noted that only 05 attributes for achieving value for money were determined from the case studies namely; cost, time, quality, sustainability and guest satisfaction. The quantification of cost savings due to VM proposals has not considered the life cycle perspective. The lack of exploration of VM job plans other than the SAVE 40-hour job plan and contractor's change proposal was also evident. Hence the results of the study have to be considered in light of these limitations.

5.5 Recommendations for Industry Practitioners

This study made certain recommendations for the industry practitioners as follows:

1. Understanding the challenges of hotel refurbishment projects and getting prepared for them
2. Understanding the challenges to apply VM in hotel refurbishment projects
3. Employing the framework, which was introduced by this study to use the strategies to enhance VM application in hotel refurbishment projects
4. Understanding the potential benefits of a successful VM study in hotel refurbishment projects

5.6 Recommendations for Academic Research

This study made some further study suggestions for academic research

1. When selecting case study projects, the scope should be expanded to different types of building facilities
2. The number of case studies should also be increased to explore the application of VM under other procurement routes and contracts.
3. Determining many other value for money attributes in refurbishment projects
4. Selecting cases, which have employed a CVS

5.7 Summary

There are numerous studies on application of VM to new construction projects, whereas less studies on applying VM to refurbishment projects is evident. Hence the current study has shed light on the application of VM to hotel refurbishment projects in Sri Lanka and further has provided guidance to enhance VM application.

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ANNEXURE I- INTERVIEW GUIDELINE

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……
……

Dear Sir/Madam,

Research Dissertation – Interview Guideline (M.Sc. (by Research)

I am a postgraduate student of University of Moratuwa, reading for Master of Science (by Research). I am conducting a research titled "A Framework to Enhance Value Management Application in Hotel Refurbishment Projects in Sri Lanka". This research is conducted under the supervision of Dr. Yasangika Sandanayake, and Dr Thanuja Ramachandra, Senior Lecturers at the Department of Building Economics.

I am conducting interviews for case studies focussing on hotel sector building refurbishment projects, which have employed value management. Below mentioned objectives are intended to be accomplished through these case studies.

1. Conduct a situational analysis on
    a) challenges in hotel refurbishment projects in Sri Lanka
    b) value management application in hotel refurbishment projects in Sri Lanka
2. Investigate the challenges and existing solutions provided during the value management application in hotel refurbishment projects in Sri Lanka
3. Propose strategies for enhancing value management application in hotel refurbishment in Sri Lanka and benefits that can be obtained from successful application

Kindly allow me an appointment to conduct the interviews. I assure that the information collected will be purely used for the research purpose, and the confidentiality of the details will be strictly maintained.

Thanking you,

B J Ekanayake
Postgraduate Student
Department of Building Economics
University of Moratuwa.
Tel: 077-4818501
Email: biyankaje@gmail.com

Section I- Details of the Respondent

1. Name (Optional): …….
2. Designation: …….
3. Name of the organisation (Optional): …….
4. Nature of your organisation/business: …….....
5. Work Experience: …….
6. What is the role you played in this hotel refurbishment project?

   ……..
7. Have you involved in the value management (VM) exercise carried out for this project?

   ……
8. Have you got any previous experience in VM?

   ……

Section II- Details of the Hotel Refurbishment Project

9. In your opinion, what do you mean by "refurbishment"?

   ……
   ……
10. Do you think that the refurbishment projects in Sri Lanka are higher in hotel buildings compared to others?

    ……
    …….
11. What were the reasons for undertaking refurbishment for this hotel building?

    ……
    …….
12. Please provide the following information of the Refurbishment Project

Details Category	Description
Procurement Method	
Type of Contract	
Contract Price	
Final project cost	
Scope of works	
Planned duration of the project	
Duration of the Project	

13. What were the stages or the main activities of the refurbishment project that were identified for the project?

    ……
    ……

14. What were the challenges you encountered in this refurbishment project?

    ……
    ……

15. How you think that the aforementioned challenges affected adversely in achieving the value for money in this refurbishment project? Please mention the value for money attributes considered

    ……
    ……

Section III- Application of Value Management in Refurbishment Projects

16. Did you consider about value enhancement in this refurbishment project?

    ……
    ……

17. If the value enhancement approach was "value management (VM)", please explain as to why you selected VM as the value enhancement approach for this project? (If you interpret VM with an alternative terminology, please explain; for example, Value Engineering, Value Planning or Value Analysis)?

    ……
    ……

18. How do you perceive the current status of VM application in refurbishment projects of Sri Lanka?

……
……

19. Did you adhere to any standard or systematic approach for conducting the VM study?

……
……

20. Please specify the VM job plan adopted for this project and explain the reasons for adopting that particular VM job plan (*The VM job plan, practiced in a VM workshop usually consists of 3 stages as Pre workshop stage, workshop stage and post workshop stage. The workshop stage further consists of 6 phases as information, function analysis, creative, evaluation, development and presentation)*

- Charette Job Plan ☐
- SAVE 40 hour Job Plan ☐
- Contractor's Change Proposal ☐
- Truncated Workshop ☐
- Concurrent Study ☐

21. Please explain about your role in the VM study of the refurbishment project

……
……

22. Did you obtain the service of a VM facilitator?

……
……

23. What was the composition of the VM team?

……
……

24. What is the venue and duration for the VM workshop/s?

……
……

25. At which stage/s of the project did you carry the VM workshop for the VM study and what were the reasons?

……
……...

26. Did you conduct a structured and systematic Pre Workshop stage during the VM Workshop, adhering to the VM job plan you practiced? *(Pre Workshop- Provides an opportunity for all parties to understand project issues and constraints as well as to receive information before VM workshop)*.

    ……
    ……

27. Did you follow the VM Workshop stage adhering to the phases in the VM job plan with the appropriate tools and techniques? Please explain any deviation from the VM Job Plan, if it was not the structured approach, which you practiced

Phases of a VM Job Plan	**Mapping with the Phases of the VM job plan actually practiced**	**Tools and techniques**
Information Phase *(Gather information to better understand the project)*		
Function Analysis Phase *(Analyse the project to understand and clarify the required functions)*		
Creativity Phase *(Generate ideas on all the possible ways to accomplish the required functions)*		
Evaluation Phase *(Synthesize ideas and concepts and select those that are feasible for development into specific value improvements)*		
Development Phase *(Select and prepare the 'best' alternative(s) for improving value)*		
Presentation Phase *(Present the value recommendation to the project stakeholders)*		

28. Did you conduct a structured and systematic Post Workshop stage during the VM Workshop adhering to the VM job plan*? (Post Workshop- Follow-up with action plan to make sure the methods proposed are implemented. Assist with implementation plan to realize actual improvement)*

    ……
    ……

29. What were the VM proposals implemented?

……
……

30. What were the impacts of the VM proposals?

……
……

31. What was the cost of implementing VM?

……
……

32. Do you think that the application of VM in this project contributed to the overall project success? If yes, please explain the contribution of VM for the overall project success

……
……

33. What were the challenges you encountered and how did you overcome each of those challenges when applying VM to the project?

Challenges encountered	Overcoming the challenges
•	•
•	•
•	•
•	•

34. What are the strategies proposed by you to enhance VM application in hotel refurbishment projects in Sri Lanka?

……
……

35. What are the benefits of successful application of VM in hotel refurbishment projects in Sri Lanka? Please explain these benefits, in terms of the value for money attributes you mentioned earlier

Value for money attribute	Benefits
•	•
•	•
•	•
•	•

-Thank you very much for your contribution-

ANNEXURE II- INTERVIEW TRANSCRIPT

Section I- Details of the Respondent

1. Name (Optional):
2. Designation: *Director-Project Management Division*
3. Name of the organisation (Optional):
4. Nature of your organisation/business: *Project management and cost consultancy*
5. Work Experience: *24 years*
6. What is the role you played in this hotel refurbishment project?

   Project Manager, appointed by the client
7. Have you involved in the value management (VM) exercise carried out for this project?

   Yes
8. Have you got any previous experience in VM? If *yes*, please describe about your prior experience in VM

   I have 10 years of experience in VM applied new building construction projects, in Middle East as well as in Sri Lanka, mainly as a project manager and a structural engineer

Section II- Details of the Hotel Refurbishment Project

9. In your opinion, what do you mean by "refurbishment"?

   I think it encompasses renovation, retrofitting, modifications, repairing, upgrading of the existing building, which is to be used for the same or the original purpose it was built for, but with a better quality, performance and functionality
10. Do you think that the refurbishment projects in Sri Lanka are higher in hotel buildings compared to others? If the answer is *yes*, please explain the reasons

    Yes, because in the sri Lankan context, tourism is a major source of national income and sri lanka is a famous tourist destination. Since, hotels accommodate tourists from various countries, unlike the other types of building facilities, hotel buildings try to maintain their status quo and keep up to date functionality. Refurbishment provides the means for this required updating and modifications. Compared to other buildings, hotel refurbishment projects are higher in Sri Lanka.

11. If the answer is *no*, please explain what type of buildings are highly subjected to refurbishment and please state the reasons

    N/A

12. What were the reasons for undertaking refurbishment for this hotel building?

    By the time, the refurbishment started, the hotel was 27 years old. From time to time, few small scale renovation and repairing projects had been undertaken to keep the hotel in good standards. In fact, the last renovation was undertaken in 2001. However, the need for a major refurbishment came in to light, since many foreign investors had already initiated constructing luxury hotels in Colombo. Also the other neighbourhood star rated hotels were modernising and upgrading. In order to stay competitive, the hotel management decided to incorporate some modern features in the hotel environment to attract more foreign and local tourists as well as to make this hotel a more reserved venue for hosting reputed events, weddings and attractive functions. As instructed by the Mother Company in USA, the refurbishment was to be carried out in 2 phases. We have completed Phase I. The phase II would be commenced in mid of 2018, because the allocated budget has not been confirmed yet.

13. Please provide the following information of the Refurbishment Project

Details Category		Description
Procurement Method	**:**	*Traditional*
Type of Contract	**:**	*Remeasurement*
Contract Price	**:**	*LKR 220,000,000*
Final project cost	**:**	*LKR 250,000,000*
Scope of works	**:**	*Refurbishment of all Front of house and selected Back of house areas.* *Refurbishment of lobby lounge thorana, Public toilets in lobby, Chinese restaurant, All Day Dining Restaurant, Main Kitchen, Board Walk, Executive Lounge including MEP Services and the procurement and replacement of kitchen and laundry equipment, lotus pond, AHU Room, Fire commanding centre and lift lobby*
Planned duration of the project		: *9 months (October 2015 to July 2016)*
Duration of the Project :		*14 months (October 2015 to December 2016)*

14. What were the stages or the main activities of the refurbishment project that were identified for the project?

The refurbishment process was difficult to be compressed in to some pre-determined stages, because revisiting the design during the construction stage occurred

1. *Project Briefing stage, in which the client instructs on his requirements to the appointed consultants and the project manager*
2. *Design stage is where the schematic design and the BOQs related to those designs are developed*
3. *Tender stage, where the call for bidding occurs and the contractor who wins the bid is awarded the contract under traditional procurement method*
4. *Construction stage is where the demolition and construction activities are taken place*
5. *Handover stage is where the refurbished building is handed over back to the client*

15. What were the challenges you encountered in this refurbishment project?

- *The parent company initially did not agree on shutting down the hotel entirely, with the fear of losing clientele and losing experienced staff, even though rest of the project team suggested for a complete shutdown. So bringing all stakeholders on the same page by agreeing upon carrying refurbishment, while the hotel was functioning was challengeable*
- *Unavailability of as built drawings in kitchen and laundry areas restrained the formulation of correct design ideas*
- *The initial conceptual design proposals put forward by the designers exceeded the client's budget which was initially stipulated by the Parent company*
- *Reviewing various design options along with budgets and agreeing upon the final concept design for each location of the hotel consumed a huge time*
- *In the isolation plan submitted by the Lead consultant by identifying the areas that can be allocated for part by part refurbishment, cold room was missing and the project execution plan formulated based on it had to be revised twice consuming unnecessary time*
- *Coordination between different parties was the main hurdle, once the main contractor was also selected for the project, especially at the post contract*
- *Complaints from the guests were evident during the initial days with the demolition activities, noises due to vibration of machines and dust*
- *Due to the ongoing refurbishment only 80%to 70% of the rooms were in operation during the year. The available room capacity was further reduced due the temporary accommodation arrangements for refurbishment*

- *Handover of the project did not occur within the planned time period, which is 9 months. So the hotel had to give up hosting some occasions in Executive Lounge and Banquet Hall*

16. How you think that the aforementioned challenges affected adversely in achieving the value for money in this refurbishment project? Please mention the value for money attributes considered

    I analysed this and I think all the aforementioned challenges contributed adversely even in minor portions to achieve desired outcomes in terms of value for money. Especially the time overruns and cost overruns we experienced during the design stage and construction mainly contributed adversely in achieving best value for money. I thoroughly believe that time is money. This project was planned to be completed within 9 months, and it ran up to 14 months, averting the hotel to host some reputed events. It caused the loss of potential clientele and profit declined. Occupancy was also down mainly due to ongoing refurbishment activities. It was evident that foreign tourists were not much eager to book the hotel, which has an ongoing refurbishment mainly due to health and safety issues and interruptions.

Section III- Application of Value Management in Refurbishment Projects

17. Did you consider about value enhancement in this refurbishment project? If *yes*, please explain as to why you considered value enhancement for this refurbishment project

    Yes. Aforementioned challenges led to the value degrading of the project because of the resulting cost and time overruns. Therefore, from the project management perspective, value enhancement for this project was about delivering the required functions without cost and time overruns while meeting the required quality and performance.

18. If the value enhancement approach was "value management (VM)", please explain as to why you selected VM as the value enhancement approach for this project? (If you interpret VM with an alternative terminology, please explain; for example, Value Engineering, Value Planning or Value Analysis)?

    Actually we interpreted it mostly as VE because it was actually applied in the construction stage by revisiting design alternatives perceiving it mainly as a cost reduction technique. That means it focussed on the technical project. However, we tend to use VM and VE alternatively. In this project, client's budget could not cover the requirements he demanded. He realised it only after analysing the cost proposals of the initial design proposals. So he instructed the design consultants to come up with proposals, which could cater his requirements, within the stipulated budget. However, they came up with mere design alternatives which still created room for value enhancement. We realised that VM is the simple and step

by step methodology to incorporate value to the project. VM could easily be understood by all the project team members.

19. How do you perceive the current status of VM application in refurbishment projects of Sri Lanka?

    I think it is very low. The so called minority who employ VM currently perceive it as a mere cost cutting exercise

20. Did you adhere to any standard or systematic approach for conducting the VM study? If yes, please explain about the VM standard or systematic approach followed

    No

21. If the answer is no,

    i. Please explain the reasons for not adhering to any standard or systematic approach for conducting the VM study

    Well, the need for employing VM did not emerge when the project was initiated and we did not have enough time to go by the book following a structured and standardised VM approach for this project. We did not follow any VM standard.

    ii. Please explain as to how you conducted the VM study for this project

    Both the project manager and the cost consultant have prior experience in the construction projects of Middle East and Sri lanka, which have employed VM. We both have participated in VM employed new construction projects in Sri Lanka as well. So we used our prior experience and the theoretical knowledge on SAVE 40-hour job plan for conducting the VM study for the project.

22. Please specify the VM job plan adopted for this project and explain the reasons for adopting that particular VM job plan (*The VM job plan, practiced in a VM workshop usually consists of 3 stages as Pre workshop stage, workshop stage and post workshop stage. The workshop stage further consists of 6 phases as information, function analysis, creative, evaluation, development and presentation)*

    - Charette Job Plan ☐
    - SAVE 40 hour Job Plan ☒
    - Contractor's Change Proposal ☐
    - Truncated Workshop ☐
    - Concurrent Study ☐

    Actually it was a shortened and less standardised version of SAVE 40-hour job plan, which we customised according to our needs, because we understood that

this approach provides the best road plan for a value study. The impetus for implementing VM emerged during the initial design stages as proposed by the cost consultant. Since it was initiated by the cost consultant, he proposed to conduct a VM workshop adhering to SAVE 40-hour job plan, after entire project team is formed.

23. Please explain about your role in the VM study of the refurbishment project

    As the Project Manager of the project, I had to oversee the VM process, especially to evaluate the cost cutting options which were derived

24. Did you obtain the service of a VM facilitator? If yes, please explain his role

    No

25. If you did not obtain the service of a VM facilitator, how did you coordinate the VM study

    Actually the cost consultant played the role of the VM facilitator and as the Project manager I oversaw the entire process

26. What was the composition of the VM team?

    Project manager, cost consultant, lead design consultant, Chief financial officer as client's representative and main contractor, MEP Engineer, kitchen and laundry consultant and interior designer, maintenance engineer

27. What is the venue and duration for the VM workshop/s?

    At the hotel premises.

    2 days (6 hours maximum per day)

28. At which stage/s of the project did you carry the VM workshop for the VM study and what were the reasons?

    Construction stage

    Even though the impetus for initiating a VM study was emerged during the initial design stages by the cost consultant to evaluate different design alternatives, project manager was of the view that in this hotel refurbishment project, the conditions of the existing old building were unpredictable and obtaining the construction and engineering knowledge of the contractor, was important. Since the project was traditionally procured, the contractor's involvement was obtained during the construction stage. During the construction stage, gradually areas were released to the contractor in accordance with the Isolation Plan. Required design details, drawing and specifications were transferred to the contractor, but considerable amount of redesigning was required due to the problem encountered after the removing of existing finishes layer as anticipated by the project manager. Due to that contractor had to carry out additional works and variations with

changes to initially agreed design options, which led to cost and time overruns and impairment to quality. So the project team agreed to carry out the VM workshop for finding value enhancing opportunities.

29. Did you conduct a structured and systematic Pre Workshop stage during the VM Workshop, adhering to the VM job plan you practiced? *(Pre Workshop- Provides an opportunity for all parties to understand project issues and constraints as well as to receive information before VM workshop)*.

    I. If the answer is yes, please explain about the Pre workshop, which you practiced

    No

    II. If the answer is *no,* please explain about the Pre workshop, which you practiced

    Actually it was not well structured and we did not even call it the pre study phase. But before commencing a value study, we realised some pre works need to be done. Initially we gathered information on previous refurbishment projects. Recently completed projects with similar scope of 5-star and 4-star rated hotels in the neighbourhood were studied. The VM team was selected during this phase. A briefing on the VM study was conducted through a presentation by the cost consultant. It was made sure the client's representative, the chief financial officer and the designers who had no prior experience in VM also understood VM process. Cost consultant was appointed as the VM team leader and he played the role of the VM facilitator.

30. Did you follow the VM Workshop stage adhering to the phases in the VM job plan with the appropriate tools and techniques? Please explain any deviation from the VM Job Plan, if it was not the structured approach, which you practiced

    No, we did not follow it as per the book. But the process we followed was very much similar to the standard method

Phases of a VM Job Plan	Mapping with the Phases of the VM job plan actually practiced	Tools and techniques
Information Phase ***(Gather information to better understand the project)***	*We did not call it by this name, but we started gathering information, which were organised from the initial design stages.* • *Introductory presentation by the cost consultant was carried out, communicating the objectives and scope of the VM study, which basically highlighted that the cost reduction and quality improvement as the main focus*	*Multimedia Presentations, Brainstorming,*

	• *Currently available as built drawings, initial design proposals and the bill of quantities were obtained* • *Problems identified in during the preliminary site survey were presented by the designers and project manager*	
Function Analysis Phase *(Analyse the project to understand and clarify the required functions)*	*We called it the project analysis phase* • *In this phase we identified 4 value enhancing opportunities as follows, which were presented as VM proposals* *I. The 4 decorative metal screens to be fixed to the wall in Thorana area* *II. The quantity of hanging glazed pendant lamps all day dining restaurant* *III. Floor finishes for the Chinese restaurant* *IV. Improvements to the suspended ceiling in the reception area* • *Determined the required functions related to the suggested scope of the project and eliminated the unnecessary functions within the scope* • *Assigned costs per function* • *Determined the worth of function* • *Hence understood that cost reductions should be achieved in the first 3 and quality wise improvement is needed for the 4th*	*Function Analysis*
Creativity Phase *(Generate ideas on all the possible ways to accomplish the required functions)*	*This stage was known as options developing phase* • *Various design and construction options for performing each proposals were generated*	*Brainstorming*

Evaluation Phase ***(Synthesize ideas and concepts and select those that are feasible for development into specific value improvements)***	*This stage was called the analysis stage* *Bill of quantities for generated options were developed* • *mostly concerned on avoiding cost overruns to map with the initial budget* • *These options were ranked from best to worst*	*Checklists* *Cost benefit analysis* *Lifecycle costing* *Rating and weighting*
Development Phase ***(Select and prepare the 'best' alternative(s) for improving value)***	*The preceding phase was overlapped with this phase. So evaluation of alternatives and selecting the best option was done as a single phase* • *Best alternative/s was selected after evaluating the ranked options*	*Checklists*
Presentation Phase ***(Present the value recommendation to the project stakeholders)***	• *Selected best alternatives were turned in to written recommendations and project manager presented them to the VM team* • *Action plan for executing the options was further developed*	*Summary report*

31. Did you conduct a structured and systematic Post Workshop stage during the VM Workshop adhering to the VM job plan*? (Post Workshop- Follow-up with action plan to make sure the methods proposed are implemented. Assist with implementation plan to realize actual improvement)*

I. If the answer is yes, please explain about the Post workshop, which you practiced

No

II. If the answer is no, please explain about the Post workshop, which you practiced

It was basically a follow-up session to ensure that all the VM proposals were executed and desired outcomes were achieved. There was no formal procedure to do the follow up. But the project manager did a presentation and VM team members had a discussion on the outcomes of the VM study. This post workshop was conducted shortly before the handover of the project to the client

32. What were the VM proposals implemented?

Proposal I-

*Satin bronze for the 4 decorative metal screens to be fixed to walls in "Thorana area", was replaced with screens of 2400*3000mm in metallic paint finish on laminated HDF board fixed to wall*

Proposal II

The quantity of hanging glazed pendant lamps in the "All-day dining restaurant" was reduced from 46 to 42 and a less expensive brand of pendant lamps was selected

Proposal III

Instead of 20mm stone tiles including tile grout, sealer for stain and wear resistance, timber flooring of 900mm wide x 15mm was proposed to be fixed for some area of 80m^2 in the "Chinese restaurant" in accordance with the manufactures specification and finished with one coat of prime, two coat of base coat

Proposal IV

For the "reception areas" of 427m^2, average 900mm moisture resistant gypsum board suspended ceiling including necessary suspension system, frames, sub frames, angle beads, all necessary accessories, making cut-outs and holes for fittings was introduced instead of the average 900mm dropped gypsum board suspended ceiling including necessary suspension system, frames, sub frames, angle beads, all necessary accessories, making cut-outs and holes for fittings

33. What were the impacts of the VM proposals?

Proposal I

Here the main focus was to give a metallic finish to enhance aesthetic appearance. In order to fulfil this functional requirement, using satin bronze seemed to be too expensive with a unit price of LKR 446690.35. So, in order to achieve the same requirement with a less expensive option, metallic paint finish on laminated HDF board with a unit cost of LKR 358491.33 was used. Cost saving was LKR 88199.02. I think the quality was not harmed, because the metallic paint finish resembles the satin bronze finish. We spent some time through the VM workshop to device this alternative. So, I think coming up with this option contributed to a minor time overrun.

Proposal II

Initially selected pendant lamps were of a unit cost of LKR 424217.30 and for 46 lamps, it amounted to be LKR 19,514,000.00 in total and with the change of brand, pendant lamps of unit cost of LKR 177167.68 was introduced reducing the total quantity to 42 lamps. The total cost was recorded to be LKR 7,441,043.00. There

was no difference in the luminance level in the 2 types of brands. It saved a cost of LKR 12,072,960.00. They were aesthetically pleasing. Exploring for a less expensive brand was additional homework for the interior designers, which consumed some time

Proposal III

Laying of stone tiles at the unit rate of LKR 47304.23 was replaced by timber flooring at the unit rate of LKR 36779.69 for the area of 80m^2. This saved a total cost of LKR 841963.20. However, in terms of durability and aesthetic appearance laying of stone tiles would have enhanced quality. Especially timber floor might subject to wear faster that stone tiles. Before the refurbishment, this area had already been laid with timber floor. So, contractor, during the deconstruction activities suggested that it would be less time consuming and convenient, if the existing timber floor was replaced with another timber floor with a better finish.

Proposal IV

The service lines, duct lines and electric cables running inside the ceiling were a total mess. We realised it only after removing the ceiling. So, the initially proposed gypsum board suspended ceiling was not strong enough and no moisture resistant provisions had been considered. Since it would affect the quality in terms of durability, strength and stability, alternatively moisture resistant gypsum board suspended ceiling was proposed. The initial option was of a unit cost of LKR 6844.26 and the latter option was of a unit cost of LKR 7643.50. Implementing the latter option incurred an additional cost of LKR 341275.50.

34. What was the cost of implementing VM?

    There was no additional cost incurred for implementing VM or conducting VM workshop, because the VM team was comprised of the members from the project team. But time is money. So, the time we spent for VM was not compensated. No overtime payments were given for the VM team for that extra time they spent and they were rather considered as meetings by the client.

35. Do you think that the application of VM in this project contributed to the overall project success? If yes, please explain the contribution of VM for the overall project success

    Yes

    In total, we achieved a cost saving of LKR 12,661,850. This is 5.06% saving from the total cost (LKR 250,000,000). Due to the quality enhancement achieved after refurbishment, which added value for money by employing VM, the average room rate increased from LKR 20,326 to LKR 21,825. Thus, value for money has been achieved. However, since we had not planned to employ VM from the inception of the project, the time we spent on VM workshops was not prescheduled. Moreover, changing some design alternatives as per the VM workshops also consumed an

extra time. Although VM workshop wasn't the sole reason for time overrun of 5 months, deviating from the original time plan, it can be said that despite the value enhancement, VM workshop contributed to time overrun, because it wasn't implemented systematically and executed without a plan. Educating and making the project participants aware of VM consumed a large share of project time. Creativity and Evaluation phases consumed much time due to arguments and convincing than other phases causing a significant imbalance of time allocation for other stages

36. What were the challenges you encountered and how did you overcome each of those challenges when applying VM to the project?

Challenges encountered	Overcoming the challenges
• *Reluctance of client to apply VM due to lack of awareness of the client about VM*	• *Since client was interested on cost cutting strategies, the importance of VM in terms of a cost cutting exercise was convinced to the client*
• *Designers were reluctant to apply VM*	• *Designers were convinced about the role of VM in exploring different design alternatives and selecting the best option by proper evaluation through a value study*
• *Lack of time to conduct VM workshops, because they were conducted while the project was going on*	• *Project Manager and cost consultant coordinated with the other project team members and organised VM workshops in the hotel premises simultaneous to scheduled project meetings*
• *Even though the interior designer and the kitchen and laundry consultant were included in the VM team from its commencement, the lack of participation those foreign companies was evident.*	• *project manager created an e-mail platform, where all the members were communicated with decisions taken at the VM workshop and any conflict of interests were allowed to be discussed and solved via this e-mail platform, within a stipulated time of maximum 1 week, to finalise the decisions*

37. What are the strategies proposed by you to enhance VM application in hotel refurbishment projects in Sri Lanka?

    - *Including the Maintenance Manager or Facility Manager in the VM process of the refurbishment project would be beneficial, since the refurbishment is conducted for buildings, which are already in operation and they know about the building more than anyone else*

- *Enabling formal education opportunities such as short courses and CPDs on VM through professional institutions and universities*
- *Incorporating VM in to refurbishment process, from the concept design stage and carrying out VM workshop during the construction stage as well*
- *Adhere to standardised job plans like SAVE 40 hour VE job plan, which gives a step by step guidance on conducting a VM workshop*

38. What are the benefits of successful application of VM in hotel refurbishment projects in Sri Lanka? Please explain these benefits, in terms of the value for money attributes you mentioned earlier

Value for money attributes	Benefits
Cost	• *VM proposals can suggest alternative material, equipment and methods, which deliver value for money in both short and long run* • *Assessing the market demand to set higher pricing levels*
Time	• *VM proposals can provide material, equipment and methods, which are installed or constructed with less time*
Quality	• *VM alternatives can preserve elements with architectural and archeological value*
Guest Satisfaction	• *Prioritising critical areas such as lobby, restaurants, bars and swimming pools through VM proposals*
Sustainability	• *Generating lighting and air conditioning solutions with energy saving and sustainable alternatives*

-Thank you very much for your contribution-