

# Identification of the Implementation Issues of Value Management Concept to the Sri Lankan Construction Industry

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**Abstract**— The concept of Value Management (VM) is a tool using for maximizing the value, it is becoming more appropriate to construction industry of Sri Lanka. The VM will help to reduce cost which help the Sri Lankan construction industry. This research goals to address obstacles to the implementation of VM in the construction industry of Sri Lanka with a view to providing conceivable measures in avoiding these difficulties and increasing the usage of the system within the construction industry. The level of knowledge and implementation of VM practices, as well as the barriers to its implementation in the construction industry were evaluated by using of a questioner survey strategy and interviews. Construction specialists were selected by means of stratified random sampling. The data was analyzed using frequency index analysis. The study reveals that the topmost challenge to implement VM as, the minimal level of knowledge of VM between construction professionals. There for flow of knowledge must be given from the undergraduate level to the senior professionals. Avoiding these barriers in order towards accomplish enhanced quality construction industry practice, it was recommended that the importance of introduce course modules relates to VM at the academic level. Further this research will benefit in study in implementing a model for VM/VE for the Sri Lankan construction context.

**Keywords**— Value Managenet(VM), Value Engineering (VE), Barriers, , Sri Lanka, Construction Industry

## I. INTRODUCTION

Value Management (VM) is a strong tool aimed at managing the planning, design, and execution of numerous aspects of a construction project (Othman *et al.*, 2021). VM is recommended as a method for maximizing the value on investment in construction projects (Ekanayake, 2019). Many experts agree that VM is a useful platform (Luvara and Mwemezi, 2017). On average, VM may save 6.81% percent of the total cost on a project. Although certain solutions have been used to address these issues, the full benefits of VM can only be obtained by improving the VM application (Ekanayake, 2019). Value Engineering (VE) is defined as the methodical application of well - known

approaches to arrive at a value for a function. VE is a VM tool for achieving the most cost-effective fundamental functions of a product, service, or project and can be viewed as a tool for making decisions. VE is a method for recommending the best structural systems for reduce overall cost of the multistory buildings at any stage of the project's Life Cycle Cost (LCC) and during the design phase (Elhegazy, 2020). Sri Lankan construction industry, VM was a new concept to in 2003, lack of the knowledge of the VM theories and some do not want to adopt to the new concepts and continue to work in the traditional ways. Because the lack opportunity to the new concept of the industry, most of the people do not follow new concepts. And some of the political issues affecting to the decision-making procedure (Perera, Karunasena and Selvadurai, 2006). But after 19 years still the implementation of VM is very low, this research will help to understand the barriers to implement VM in construction project in Sri Lanka.

There are more benefits that can be obtained by implementing VM to the Sri Lankan construction industry. Only some are minimized the whole life cycle cost of the project while maintaining a higher quality of the output, can improve the functionality, reducing the extra cost and the hidden cost of the project to increase the quality of the outcome, without a cost overrun and to increase the sustainability of the economy of the country by effecting Gross Domestic Product (GDP) (Perera, Karunasena and Selvadurai, 2006). Because increasing the efficiency of the construction industry that effecting to the country's economy. VE effect the development of construction industry in Sri Lanka by increasing the investment portfolio in new sources and encouraged investing in construction project (Perera, Karunasena and Selvadurai, 2006). Therefore, Sri Lanka also needed a focus to implement VM to Sri Lankan construction industry. The construction sector is practicing VE in the same old fashion as it was 50 years ago (Perera, Karunasena and Selvadurai, 2006). And also, the VE and VM is applying in a lower rate in Sri Lankan construction industry (Zhang, Mao and AbouRizk, 2009). Therefore, clearly understand that there is a lack of implementation of VE and VM in Sri Lankan construction industry.

As a developing country 6.2% of Sri Lankan GDP is contributed through the construction industry of Sri Lanka in 2020 as per International Trade Administration United State of America. Due to the financial crisis in Sri Lanka the construction industry is disappointment (Authority, 2022). And funding for a new project is considered as impossible due to the depreciation of the Sri Lankan currency as stated in Central Bank of Sri Lanka (CBSL), the Sri Lankan rupee depreciated by 33.0% against the us dollar by the 8th of April 2022. VM will enhance the project functionality by maintaining a cost certainty and it will affect to the development of the construction industry along with it will help to advance the economic status of Sri Lanka by contributing to the national GDP. This research intends to be finding the barriers which encounters with the implementation of VM techniques in Sri Lanka to improve the project performance.

## II. LITERATURE SURVEY

### A. Value Management Concept

Value Management is a function-oriented management strategy that has been shown to increase design, construction, and cost effectiveness in many constructions and transportation project aspects (Luvara and Mwemezi, 2017). A value management study is often conducted as a workshop in which a diverse team of stakeholders reviews the project, ensures that the team understands customer wants, and produces a cost-effective solution under the guidance of a professional facilitator who follows a system of rules (Mild and Adrian, 2007). The successful implementation of a value management program expects additional benefits such as constant updating of standards and policies, accelerated incorporation of new materials and construction techniques, employee enthusiasm from decision-making, and increased skills gained from team participation (Luvara and Mwemezi, 2017).

### B. Value Engineering Approach

Both Value Management and Value Engineering are focused with enhancing the ratio between benefit (outputs) and needed cost or effort (inputs), although they are generally distinguished by their timing and size (RICS, 2017). Value Engineering is a cost-controlling, productivity-boosting, and quality-improving methodology and a strategy for determining "best value" by studying the functions of an object or process (Senay Atabay and Niyazi Galipogullari, 2013). A traditional Value Engineering study primarily relies on free-thinking techniques (e.g., brainstorming) to generate creative ideas and solutions (Zhang, Mao and AbouRizk, 2009). Value Engineering methods can be used at any point of a project's development cycle. The optimal moment to use a Value Engineering methodology when the project's essential

purpose is not determined, and other approaches may be found and examined (Nguyen and Luu, 2016).

### C. Value Management Concept in Sri Lankan Construction Industry

The construction industry in Sri Lanka generally contributes up to 6-7% of the national GDP (Gross Domestic Product). In 2020 the construction industry has contributed 6.2% but 6.1% in 2021 (Annual central bank report 2020 and 2021). Rather than this construction industry contributes on employment, tax, income etc. (Perera, Karunasena and Selvadurai, 2006). According to the central bank reports we can identify a lack of efficiency in the Sri Lankan construction sector due deficiency of international investments and international competition on projects. Due to the inefficiency in current construction sector, it can identify that additional cost occurrences within the construction projects are high. The current economic crisis facing by the country also directly effects on this inefficiency.

Thus, the international investments to the construction may lost. Also, it effects on additional cost occurrences within the construction projects, and it may bring the failure of the project. Thus, the value management is a good approach to adopt on construction projects both in pre contract and post contract stage. The value management approach saves 30% cost savings in a construction project (Perera, Karunasena and Selvadurai, 2006). It may provide good solutions even for the economic crisis facing by the country because most of the construction projects have been halted or terminated due to some force majeure situations faced by Sri Lanka since 2019 (easter Sunday attack, covid -19 pandemic).

The Value Management approach to the Sri Lankan construction context is still new and most of the construction firms and professionals are still following traditional procedures. These traditional procedures always bring the construction project as over budgeted. But the technological evaluation and knowledge and experience of the professionals deviates modern construction projects from traditional procedures. Thus, the VM and VE are best concepts to adopt in Sri Lankan Construction context to save the money and improve the worth (Karunasena and Rajagaloda Gamage, 2017; Perera, Karunasena and Selvadurai, 2006)

## III. METHODOLOGY

This section includes the methodology for the research study and the techniques that analyze the data. This research study aims to identify the implementation issues of value management concept in the Sri Lankan construction context. The research was on a basis of the

questionnaire survey and interviews. The research was a quantitative (a common way via questionnaire) and a qualitative (interviews) analysis to create recommendations based on the opinion of considered parties.

#### A. Data Collection Methods

The prepared questionnaire was issued among the professionals presently engaged in the Sri Lankan construction field. The web based (google form) questionnaire was developed and distributed through emails to the professionals. A total of 60 questionnaires were distributed using stratified random sampling and has an 85% of response rate including 17 engineers, 23 Quantity Surveyor, 5 Architect, 2 Academia and 4 Others (client, Draftsman etc.). The questionnaire contained 3 sections.

- Section A – Respondent’s background information
- Section B – Aim to obtain the respondent’s perspective to each implementation issue mentioned under this section using “Likert scale” (Likert, 1932). By providing option from 1 to 5 to select as their perspective.
- Section C – The additional comment from the respondents in any area from section B or other related area which they have been experienced.

Semi structured/flexible interviews, purposive sampling deliver the freedom to discuss about various areas widely. The interviews are conducted through online due to the prevailing circumstances where the main objective to find implementation issues and remedial action to mitigate any issues. Quantity Surveyors, Engineers, contractors, Project Managers were selected as the professionals to be interviewed.

#### B. Data Analysis Methods

As per Durdyev and Mbachu (2017) the analysis must be reviewing the reliability with the research objectives and experimental data of the study. The collected data was analyzed using Microsoft Excel and “Relative Indices” techniques (Hafez, et al., 2015). The results from the survey were analyzed by Frequency Index (FI) Analysis considering the relative frequency of occurrence of the terms identified implementation issues.

$$Frequency\ Index\ (FI) = \frac{\sum_{i=1}^5 a_i \times f_i}{H \times N}$$

Equation 1: frequency index (FI)  
Source: (Hedays and Saad, 2017)

Were,

$i$  = Score of the factor ranging from Unimportant =1 to Very Important = 5

$a_i$  = Weight of the response for the  $i$ th response  
 $f_i$  = The frequency of the  $i$ th response from all respondents  
 $H$  = Highest ranking available (Which is 5 in this survey)  
 $N$  = Total number of respondents who have responded the question

Presentations were found in the form of graph and tables & a coding system was used to realize the implementation issues separately for the facilitate easier understanding.

#### IV. DATA ANALYSIS

The gathered data was analysed according to the objectives of the research. The analysis was done with the computed results which were gained through Google Form and the identified factors were ranked on the "Relative Indices" method, which is described under methodology.

The questionnaire was designed based on identified implementation issues in VM. Construction activity is a complicated work item that needs the take responsibilities of different parties who specialize to different degrees regarding to their job specification. So, it is important to get the idea of the different parties which are involved in a construction project regarding VM, covering Project Managers, Cost Consultants (Quantity Surveying), Engineers, Architects, Academia, & others. Among the professionals, a set of 60 questionnaires were distributed, and an impressive 51 responses were received. The scope of work limited to the value management approaches in the Sri Lankan context.

##### A. Analysis of General Information

First targeted to find out whether these professionals knowledgeable VM or VE. According to the analysis of 51 responses, 46 respondents know the concept of the VE/VM concept. It is 90.2% as the overall percentage as shown in Figure 1.

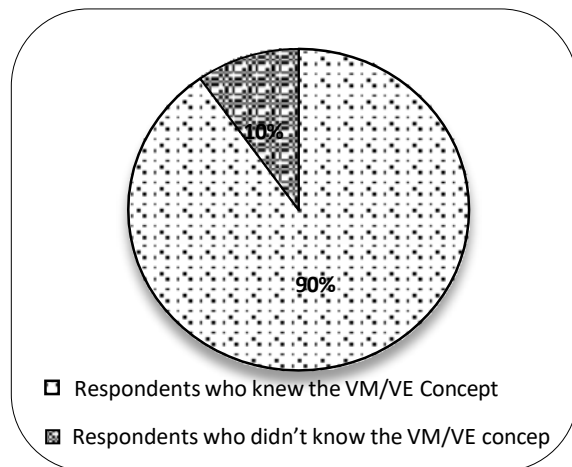


Figure 1-Total respondents

Respondents’ percentage based on profession is given in the Table -1.

Table 1- Respondents percentage based on questionnaire survey

Profession	No: of Respondents	Percentage
Engineer	17	33.3%
Quantity Surveyor	23	45.1%
Architect	5	9.8%
Academia	2	4.0%
Others (client, Draftsman etc.)	4	7.8%

Out of 51 respondents, 92% think the VM concept is suitable for the construction industry of Sri Lanka as in the *Figure 2*.

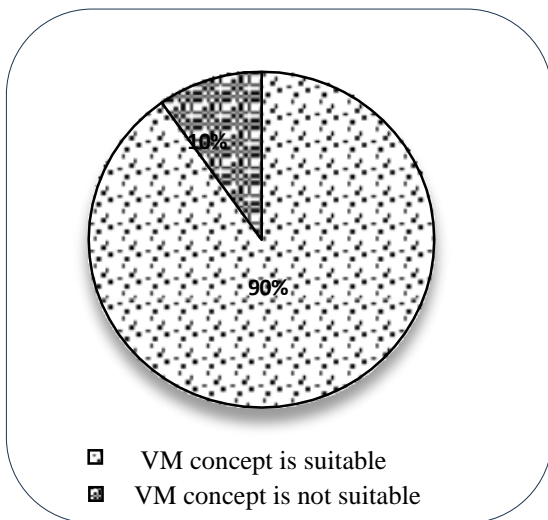


Figure 2- concept is suitable for the Sri Lankan construction industry

The projects that those professionals' related firms/ organizations implemented VM were evaluated due to the objective of the research which is to find out the utilization extent of VM/VE concept in construction industry in Sri Lanka. Below chart explains the number of projects that respondent's related firms/organizations implemented VM/VE. Based on the below chart, the majority of respondents didn't use VM/VE in their projects. That amounted to 45% of all respondents.

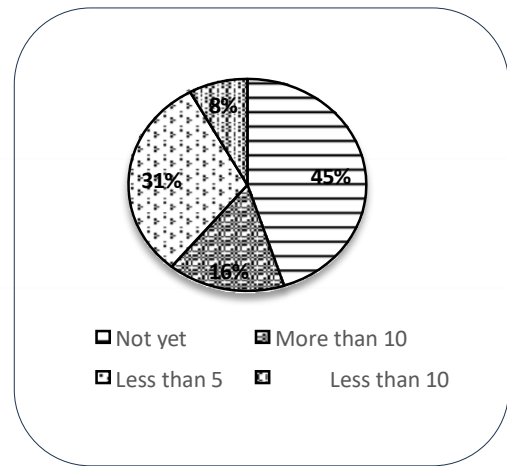


Figure 3-the projects that respondent's related firms/organizations implemented VM/VE

Then it was a target to find out the utilization extent of the VM/VE concept in theS construction industry in Sri Lanka. From 51 respondents it shows, the use of VM/VE is not widely used in Sri Lanka. That is 66.7%.

**B. Rank the Key Issues of VM**

Through an extensive review, some common VM challenges were identified as follows.

Table 2 - Ranking the Key issues of VM

Code	Barriers	FI	Rank
VM7	Lack of VM professionals and qualified VE team	0.78	1
VM1	Absence of knowledge of VM	0.76	2
VM4	Lack of awareness of the training and advice regarding the benefits of VM	0.76	3
VM6	Absence of standard procedures for the VM process in Sri Lanka due to Lack of government legislation and policy.	0.75	4
VM2	Absence of VM application records	0.74	5
VM3	Not giving enough VM knowledge from the undergraduate level.	0.74	6
VM8	Lack of understanding, participation, and negative consequences on VM through VE team members	0.72	7
VM12	Unwillingness on the part of consumers to bear any additional costs but not knowing time saving benefits	0.72	7
VM13	The younger industry parties were discouraged from the comments given by top-level traditionally practiced professionals	0.72	7
VM15	Weak coordination and working relationships between stakeholders	0.72	7
VM11	Lack of confidence in introducing new concepts like value management to clients	0.71	11
VM5	Absence of support from the parties with authorities	0.70	12
VM9	Not enough time allocation to preparing brief at the initial stage	0.69	13
VM10	Lack of appropriate time to adopt value management	0.69	13
VM14	There isn't any participation by the contractor's side in design	0.66	15

According to the results that are collected from the data collection the highest mark came to the VM7 by applying to the frequency index formular as mentioned in the methodology. VM7 represents the lack of VM professionals and qualified VE team as the result it shows in the construction industry of Sri Lanka has a minimal number of professionals who are incapable of dealing with

VM applications. The VM1 came in the 2<sup>nd</sup> in rank in Sri Lankan context there is an absence of knowledge of VM this is a critical factor because this can be a reason to VM7 to be in the first in rank. VM4 came in 3<sup>rd</sup> as there are not enough training programs as well as advice because the specially as VM7 there are not enough professionals who can give advice on VM. As VM6 there is not a specific procedure in implementing VM as the table it is major barrier. VM2 can be a major issue will be because there are very low number of records that can find in the construction industry of Sri Lanka. This will discourage the projects to implement VM in their projects because there are no records that have sufficient details about the VM. Above mention factors has the highest frequency indexes.

The coordination and the stakeholder relationship will be a factor to consider but as much as VM7 and VM1. Lack of introducing the concept to a client who is not familiar with the construction field the is ranked at 11<sup>th</sup> position there for it is not a major barrier, but this is a byproduct of VM7 and VM1. And the other factor is since there is no proper knowledge and related professionals. there is no time allocation for VM as the results shown in the table. The three is not enough time is allocated for the adaptation of VM during a project and since there is not proper adopting procedures of VM as VM6 and VM9. VM14 means there are some participants by the contractors' side for the design there for we can assume that the VM implementation is not affected by the parties that are involved with the design. VM14 has come at last with the rank according to the table but still the frequency value is high.

The other issues which found out by the questioner was, the lack of technology usage like "Building Information Modeling (BIM)" has been a main issue on implementing this concept on construction projects. Not having better communication with the oversea Value Management practitioners and the conventional procurement practices also not helps on adopting proper VM ideas in a construction project. Also, it has been identified that most of the larger projects use to adopt this concept on their projects rather than using them on moderate scale projects.

## V. CONCLUSION

This study intends to identify the challenges that Sri Lanka faces when implementing VM approaches to improve project performance. However, the second objective is to rate and prioritize the barriers to VM adoption that were gathered from the questionnaire. Through the practice and in academia, the information obtained from this analysis is intended to be useful. As the conclusion, the study used Sri Lanka as a case to evaluate measures for evading and enhancing the system's implementation in the construction industry. The study's utmost important finding is that Sri Lanka's building and construction industry still has even

less VM adoption. By this survey, majority of the organizations doesn't use VM/VE and the team does not use its principles. This same implementation issue was found by Idris Ethan in his research on Barriers of Value Management Implementation for Building Projects in the Egyptian Construction Industry (Othman *et al.*, 2021). Although the scope of this research was limited to Sri Lanka, research on VM obstacles can be expanded to other developing nations where such studies have not yet been conducted. Additionally, different strategies for promoting the practice can be explored, particularly when looking at nations where it has been fully embraced.

## VI. RECOMMENDATIONS

According to the data analyzed, to implement the concept of VM and VE followings can be suggested as the recommendations. These recommendations can suggest either long term or short term.

### A. Long Term

The execution of following recommendations take prolong period. The suggestions made as.

- 1) Adopting new government rules and policies on VM/VE areas
- 2) Introducing more modules on the concept of VM/VE for the undergraduate students.
- 3) Giving opportunities to share the knowledge of the younger professionals regarding and motivating them to implement their skills.
- 4) Adopting BIM with the concept of VM and VE

### B. Short Term

Following recommendations can be executed short termly to give an idea on VM and VE concepts for both professionals and for the professionals yet to be, such as.

- 1) Recording VM, VE applications of different construction projects as historical data for the upcoming construction projects
- 2) Introducing and promoting workshops, CPD's (Continued Professional Development) and training programs.
- 3) Introducing value management application model for the future usage of the concept
- 4) Introducing VM and VE guidelines and manuals in local language also since most of the expertise are not aware in the technical jargons and correct meaning of the concept with highlight as main recommendation.

## VII. RESEARCH LIMITATIONS AND FUTURE DIRECTIONS

While this research focuses on the key issues of implementing the VM/VE concept in the Sri Lankan construction context, further studies can be done to investigate issues of implementing the VM/VE concept in other countries also, and studies can be done to integrate the VM/VE concept with modern technology such as BIM. By using these identified implementation issues and related remedies given by the professionals, further studies can be done by creating a model to implement VM/VE.

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## ABBREVIATIONS AND SPECIFIC SYMBOLS

BIM – Building Information Modeling

CBSL – Central Bank of Sri Lanka

CPD – Continued Professional Development

FI – Frequency Index

GDP – Gross Domestic Products

LCC – Life Cycle Cost

VE – Value Engineering

VM – Value Management

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