Contribution of Value Management to Construction Projects in South Africa

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Abstract:
For clients, owners and financiers of construction projects, construction process signify a huge capital investment which translate into substantial fixed costs for their organizations. Value Management (VM) is a business strategy tool to ascertain whether construction of a facility will provide best function at the lowest possible cost. This study examines the contribution of value management to construction projects with a view to assessing challenges and measures to improve adoption and application of the discipline. Primary data were collected through well-structured questionnaires administered on construction professionals within the study area and Mean Item Score was used for data analysis. The major contributions of VM to the South African construction industry include optimize value for money, creates a clearer focus on the project objectives and works towards arriving at a more effective design. However, poor communication, lack of interaction and unwillingness of clients to pay for VM service, were the challenges affecting the adoption of VM. In order to improve construction project performance using the process of value management, orientation meetings should be duly organised, team structure should be finalised and team members must be appropriately selected for construction projects. Built environment professionals - including construction and project managers, should familiarize themselves with VM and strive for its full adoption and implementation for construction projects in order to achieve best value at the lowest complete life cycle project cost for construction clients.

Keywords:
Construction, Project, Teamwork, Value Management

1 Introduction

Value Management (VM) is a concept that has been used in construction projects for several years in United States of America and United Kingdom (Bowen *et al.,* 2010). There are other terms that are synonymous with VM, these include Value Planning (VP, Value Engineering (VE) and Value Analysis (VA). However, some authors claim that VP takes place at the planning stage of a project, VE takes place during working drawing and production stage while VA is practiced at the construction, occupation and post-occupation stage. The three terms are summarized as VM and this has been accepted and adopted as a construction management tool in the construction industries in South Africa and most other countries around the world. In South Africa, Value Management was introduced in 1968 by Union Carbide (Sigle *et al.*, 1999). However, Coetzee (2009) stated that Value Management in South Africa is not yet a process well known and it is also a concept not yet fully practiced in the South African construction industry by relevant parties. Manoliadis (2013) also noted that the use of VM to assimilate sustainability into construction has not been taken into consideration in the country.

According to Ellis *et al.* (2007), VM became more widely spread in the 1990s after VE has evolved. However, Kelly (2007) noted that VM began within manufacturing industry of the

United States of America (USA) in 1947 and has been referred to as VA, then it was later renamed VE. Lin and Shen (2007) together with Afshar and Rezaei (2013) emphasizes that VM was referred to as VE and was first introduced by Lawrence Miles in the 1940s as an organized approach to provide necessary functions at the lowest cost. This implies that VM came into existence in the 1940s and it has become a useful tool in every sector of the economy including the construction industry. Norton and McEllligott (1995) concluded that VM has become a blanket term that covers all the value techniques, whether they are called VP, VA or VE. VM is a systematic, multi-disciplinary and structured methodology that improve the value and whole life cost of a facility through detecting opportunities to remove unnecessary costs while ensuring that quality, performance and other critical factors will meet or exceed expectations of customers (Shen and Liu, 2004). The main objective of the discipline is to ensure that projects are delivered to the best function at the lowest possible whole life cost.

Clients' satisfaction is a major determinant of construction project performance. However, there has been change in clients demands and this has lead to innovative and modern approach to achieve their demand. Value Management seeks to address challenges such as budget constraints or restrictions by seeking to reduce unnecessary costs towards the project without affecting quality and reliability. This study therefore evaluates construction professionals' perspective of the contributions of VM to the South African construction industry in South Africa with a view to improving the utilization of the discipline in the industry.

2 Literature Review

Value management is not a cost-cutting exercise as perceived by many but the major focus of the exercise in on function of an element or project. This implies that project is procured at the lowest possible cost by employing various cost control mechanism without jeopardizing the value and function of the project.

2.1 Value Management and the Construction Industry

VM plays an important role in the construction industry. It is a cost management tool because it highlights all the ideas that would ensure that projects are delivered at the least possible cost while maintaining value and function. Coetzee (2009) noted that VM services should be combined with the total project economics service to achieve the best results from the VM process. For many organizations construction represents a huge capital investment which translates into significant fixed costs and may represent a constraint upon an organization's flexibility. Therefore, VM are applied in the construction industry to address the business strategy issue of whether the construction of a facility represents the best manner in which to meet the organization needs (Norton and McElligott, 1995). It should never be seen as a quick fix or cost cutting exercise for projects in trouble (Srinath and Hayles, 2011).

VM ensures that all project participants have a clear understanding of the project brief and work towards requirements of their clients (Coetzee, 2009). Manoliadis (2013) concluded that the purpose of VM is to increase performance of the construction projects and to address resources other than cost. VM process ensures that all project participants have a clear understanding of the project brief and work towards the client's requirements. It also offers the means for project stakeholders to contribute to a better built environment and ultimately the opportunity to accelerate development.

Originating from other industries, VM is as an essential part of project, construction, lean, risk, and knowledge management system in the construction industry. It can be undertaken by a

range of construction professionals but need the involvement of experienced facilitators. VM is an activity based on systematic processes and utilise multidisciplinary teams in creative workshops. VM is a means of defining project the objectives at uncertain events and it needs creativity in order to generate options which meet required functions (Hiley and Paliokostas, 2001). A common technique used for the exercise is brainstorming which an important tool for enhancing value of any project. VM enhances value by clarifying objectives, establishing good communication and preventing conflicts. VE promotes the elimination of unnecessary cost and as a consequence adds value to the project. Both techniques improve decision making

2.2 Barriers to Adopting VM in construction

The level of awareness, adoption and utilization of VM in South Africa is still very low as observed by Coetzee (2009) and this has contributed to low value of construction projects. Norton and McElligott (1995) stated that the basic reason to adopt VM is that there are always elements or factors involved in a project which contribute to poor value. According to O'Farrell (2010), VP, VE, VA and VM are often misunderstood by participants as devalue which may contribute to the level of adaptation of VM to construction projects.

Another issue is the process involved in VM workshop. The important aspect of VM is that the structure usually contains a five-phase process known as the job plan conducted during the VM study or workshop to ensure improvement of project performance (Ashworth *et al.,* 2013). In decision making, the VM framework offers an auditable process for decisions for both parties to review and contribute information. This method which enables the team members and stakeholders to tackle each approach one step at the time in order to make decisions is called a VM job plan which differs rendering to the timing within the project and scope of the study. The purpose of the job plan is to identify and establish a balance of the objectives between stakeholders, then throughout the project it is concentrated on the choices evaluation and the design process with the activity to achieve the best value for the stakeholders (Srinath and Hayles, 2011). O'Farrell (2010) illustrated the job plan approach into 6 stages that are interwoven. These stages are information, function analysis, creative, evaluation, development and presentation. The problem is that the decision to proceed or revert to an early stage depend solely on the team members and this may not provide the best solution as expected of the exercise. For instance, if the team perceived that the result is not satisfactorily after the evaluation phase, they can revert to creative phase to seek better solution.

There also some risks associated with VM and these can jeopardize the objectives of the exercise. These risks according to Seeley (1996); and Chhabra and Tripathi (2014) have direct impact on the exercise and can only influence the entire project negatively. Poor representation of the project stakeholders in the VM workshop that can result in them influencing the exercise. More so, incorrect assumptions can also occur during the exercise due to insufficient and poor quality information that is distributed. Another issue is insufficient allocation of time that can affect the expected outcomes from the VM study. The exercise can also disrupt project team and affect their activities, incur extra fees for the clients/sponsors and can extend design period if not properly managed.

3 Research Methodology

In order to examine the contributions of VM to the South African construction industry, determine the challenges affecting the its adaptation and establish measures that can be taken to improve construction project performance using the concept of VM, quantitative research approach was employed because it is more accurate and seeks to control for errors and bias in

design. Survey design was therefore adopted through the administration of close-ended questionnaires on target population comprising of Architects, Builders, and Quantity Surveyors, Construction Managers, Project Managers and Civil Engineers who are registered with their various professional bodies in Gauteng province, South Africa.

The study ensure that the professionals are currently working on on-going or have worked on completed construction projects in the last one year. List of these professionals were obtained from their professional bodies in order to ensure accuracy of information and ensure that quack is not contacted for the study. Convenient method was employed in the sampling of respondents due to time and cost constraints of sampling the whole population. Gauteng was also selected because of high level of construction activities going on in the area that has attracted construction professionals from other provinces of the country.

Questionnaire was adopted to ensure flexibility in data obtained from the respondents, provide clear implications and ensure higher response rate. These were structured in English language which is the official language for education and trading the respondents went through before becoming professionals. The first part of the instrument address general information about the respondents while other parts were structured based on the three main objectives of the study. A covering letter was also provided detailing the purpose of the study, average duration it will take to complete a questionnaire and other information relating to confidentiality of the data provided. 60 questionnaires were administered personally and through email out of which 47 were retrieved.

5-point Likert scale was used as the basis of obtaining data with 5=Strongly Agree, 4=Agree, 3= Neutral, 2=Disagree and 1=Strongly disagree. The 5-point scale was converted to Mean Item Score (MIS) for each of the identified variables for the purpose of determining relative importance of the items, and thereby ranking them in descending order.

4 Findings and Discussion

4.1 Background information of respondents

On the average, the respondents are currently involved in about 2 projects. 53% of them are males while 47% are females. Respondents were spread across the four ethnic groups in that 81% are Africans, 11% are White, 6% are Coloured and 2% are either Indian or Asian with an average experience of about 9 years. On the profession of respondents, 33% are quantity surveyors, 24% are architects, 11% are engineers, 11% are project managers, 9% are builders, 6% are construction managers while 6% are site agents.

4.2 Benefits of Value Management to Construction Industry

On the level of adoption of VM to construction projects, it could be observed that the practice is mostly used for renovations and housing estates projects. It is also common in hospitals, schools and government offices construction while it is rarely used in civil and heavy engineering construction works.

The major advantage of VM to South African construction industry as revealed in table 1 are optimization of value, clearer focus on the project objectives and more effective design. It also identifies of unnecessary costs associated with project, enhances client involvement, provides the structure for project team to collaborate, advances design decisions and highlights various design options for selection. The least benefits are improving design efficiency, provides an

authoritative review of the project, enhances consensus between stakeholders affords an independent functional review of construction project.

Table 1: Contributions of Value Management

Benefits of VM	**MIS**	**σX**	**R**
Optimize value for money	4.36	10.12	1
Creates a clearer focus on the project objectives	4.30	7.57	2
Works towards arriving at a more effective design	4.21	8.08	3
Identifies unnecessary costs associated with the project	4.19	9.36	4
Improve ways to comply with the project brief	4.15	11.53	5
Seeks to obtain maximum efficiency ratios.	4.13	3.21	6
Mutual understanding between the stakeholders is enhanced	4.13	9.98	7
Provide clear definitions of responsibilities	4.09	6.66	8
Value Management discovers project issues, constraints and risks involved	4.09	8.26	9
Supports information of the project brief	4.09	13.43	10
Client involvement is enhanced	4.09	8.92	11
Highlights design options for selection	4.06	7.93	12
Advance design decisions	4.06	8.46	13
Provides the structure for the team to collaborate	4.06	10.11	14
Provides the structure for the team to gain the benefits of partnering.	4.00	6.85	15
Provides clear definition of roles	3.98	6.90	16
Provides management with authoritative evaluations	3.94	9.11	17
Reduce project costs	3.94	9.14	18
Provides an authoritative review of the project	3.91	8.33	19
Improve design efficiency	3.91	9.46	20
Consensus between stakeholders is enhanced	3.89	9.11	21
Value Management can afford an independent functional review	3.70	9.91	22

MIS=Mean Item Score; σX= Standard deviation; R=Rank

4.3 Barriers to Adoption of VM in the Construction Industry

The major challenges affecting the adaptation of value management in the industry are poor communication and lack of interaction among construction team members coupled with the fact that clients are unwilling to pay for the service of VM. Equally important factors are insufficient time to do the job, VM session not properly facilitated, VM can easily be misunderstood by the participants, incorrect assumptions by stakeholders, lack of needed information, lack of experts in VM exercise and VM incur extra fees. Others are outdated standards or specifications, difficulty in conducting evaluation and resistance from design consultants.

Table 2: Challenges of VM adaptation

Challenges	MIS	σX	R
Poor communication	4.34	10.53	1
Clients are unwilling to pay for the service	4.06	8.26	2
Lack of interaction	4.06	11.73	3
Not enough time to do the job	4.04	7.50	4
Value Management session is not properly facilitated	4.02	8.50	5
Can easily be misunderstood by the participants	4.02	9.78	6
Poor representation of the project stakeholders in the Value Management study	4.00	9.14	7
Lack of coordination between the designers	4.00	10.74	8
Value Management session is not properly guided	3.96	8.32	9
Incorrect assumptions	3.94	6.13	10
Lack of participation	3.94	8.53	11
Lack of needed expects	3.89	4.79	12
Lack of needed information	3.89	5.91	13
Incur extra fees	3.89	9.81	14
Deficiency of coordination between operations' personnel	3.87	6.29	15
Clients do not request the service	3.87	8.06	16
Extra work for existing project team	3.85	6.55	17
Difficulty in conducting analysis	3.81	5.50	18
Not adequately supported by senior management	3.79	6.11	19
Extend design period	3.79	8.79	20
Outdated standards or specifications	3.77	5.91	21
Value management skills are unavailable	3.77	6.11	22
Scope of changes for missing items	3.74	6.40	23
Difficulty in conducting evaluation	3.74	6.45	24
There is resistance from design consultants	3.66	2.50	25

MIS=Mean Item Score; σX= Standard deviation; R= Rank

4.4 Measures to Improve Project Performance through VM

Table 3 indicate factors to be considered in order to improve project performance using value management principles in the construction industry. There is a need for innovative ideas and solution, orientation meeting for team members to familiarise with the project and process, cost estimate verification during the exercise and excellent communication skills. More so, positive environment must have created for members, a visit to the site should be arranged for team members, proper introduction of value management facilitator should be ensured and a knowledge management system should be developed for the discipline.

Table 3: Measures to improve construction project performance using VM

Measures	MIS	σX	R

Innovative ideas and solution	4.47	11.37	1
Excellent communication skills	4.38	9.45	2
Orientation meeting	4.38	12.10	3
Cost estimate verification	4.38	13.32	4
Selection of the value management team members	4.36	11.30	5
Function Analysis	4.34	10.21	6
Finalizing the team structure	4.32	8.39	7
Evaluation criteria	4.32	11.68	8
Developing a performance measurement framework for value management studies	4.30	9.45	9
Record all the ideas shared in the value management sessions	4.28	9.71	10
Information gathering	4.28	10.24	11
Positive environment	4.26	6.66	12
A visit to the site	4.21	9.50	13
Structuring the process	4.19	8.50	14
Introduce the value management facilitator	4.17	11.18	15
Creative thinking techniques	4.15	9.61	16
Deciding on the duration of the value management session	4.11	8.96	17
Establishing a group support system	4.11	11.30	18
Determining study location and conditions	4.09	11.18	19
Preparation of models	4.09	11.73	20
Using value added/based strategies	4.06	7.37	21
Preparation of efficiency data	3.96	9.64	22
Developing a knowledge management system	3.96	10.40	23

MIS=Mean Item Score; σX= Standard deviation; R= Rank

4.5 Discussion of Findings

VM has contributed to the performance of construction industry in no small measure. In support of May (1994), Norton and McElligott (1995), Seeley (1996), and Oke *et al.* (2015) argue that VM enhances project value, improves design efficiency, optimizes value for money and advances design decisions. It also creates clear focus on the project objectives, discovers project issues, constraints, and risks involved, and provides an authoritative review of the project. In addition, Coetzee (2009) notes that VM will not only provide clear definitions of responsibilities but will also ensure mutual understanding between the stakeholders and provides clear definitions of roles if fully adopted.

The major challenges of VM adoption in the construction industry are concerned with stakeholders' issues and wrong perception of the discipline due to lack of training, orientation and proper awareness of stakeholders. Chhabra and Tripathi (2014) identified lack of needed information as well as difficulty in conducting evaluation and analysis as major challenges while Seeley (1996) identified extra work for the existing team as the major challenge. Ashworth *et al.* (2013); and Aghimien and Oke (2015) also stated that lack of enough time to

do the job, unwillingness of client to request and pay for the service are the major factors. Norton and McElligott (1995) noted that the major variable is poor communication and it could be noted that these challenge would have encountered where the earlier stated challenges are prevalent. Adopting modern method and effective commutation will enhance and improve adoption and utilization of VM in the construction industry. In agreement, Ashworth *et al.* (2013) identified function analysis as one of the most effective measures while Norton and McElligott (1995) and Coetzee (2009) concluded that selection of value management team members, finalising the team structure and duration of the study were the most effective measures to be taken to improve project performance using the process of VM in the construction industry.

5 Conclusion and Further Research

Value management has contributed to performance of construction projects as evidenced in studies and findings from various countries where it has been fully implemented. In South Africa, the discipline has not fully adopted and utilized for construction projects due to lack of awareness, insufficient information about the discipline, wrong perception of the discipline, unwillingness on the part of clients to adopt and pay for the exercise as well as lack of motivation from other concerned stakeholders. However, the fact that it has been introduced and used mostly for renovation and school projects has contributed to the goal of construction projects, which is to provide value for money for construction clients and enhance better project performance. It has serve as a viable management tool to optimize value for money, create clearer focus of project objectives, works towards more effective design and identifies unnecessary costs through unnecessary design, material, labour and machine.

In order to improve the use of VM for better performance of construction projects, there is a need to adopt innovative ideas and solutions that will work for South African construction industry considering the culture and state of mind of the general citizen. There is also a need for excellent communication skills of construction professions since they are all potential VM team member and more information gathering to understand effective ways of applying the discipline. Appropriate and relevant guidelines as well as legislations to adopt, enforce and monitor the application of the discipline is also an important prerequisite.

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