Drivers of Value Management Implementation in Building Projects in Developing Countries

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Abstract: Value management (VM) has become an accepted approach in the past decade, using tools and methods that have been ordinarily understood. VM is often subjected to time and resource pressure. The determination of the possible critical success factors (CSFs) of VM in the building projects in developing countries is an essential matter to success these projects. This study identified 34 factors and drivers to adopt VM in the construction industry. This was achieved through qualitative approach by conducting interviews with fifteen experts with substantial years of experience in building projects. Results revealed that some new factors appeared in the Egypt context that have not existed in previous studies. These factors can aid the adoption of VM practices in the building projects in the Egypt construction industry. The findings thus represent the true reflection of the VM drivers in Egypt, and their recommendations effectively encourage the adoption of VM by Egypt and also other developing countries, as they face similar problems and need similar drivers in promoting the adoption of VM in the building industry when building projects are carried out in similar method, and style.

Keywords: Project management, Value management, building projects, Construction projects, Developing countries.

1. Introduction
In most developing and less developed countries in the world, value management theory (VM) is rapidly gaining popularity. This is because of the need for construction experts to employ other strategies to respond to customer expectations and constantly changing demands in terms of quality and function while also delivering projects at a reasonable price. Through producing quality product at a reduced cost, VM obtained value for money [1]; [2]. This method has quickly developed and spread to many sectors and countries throughout the world [3]. In the late 1940s, Miles of General Electric conceptualized VM in the US industrial sector in response to the parts shortages resulted from the
Second World War. VM was extended the construction industry in the early 1960s [4]. Other materials were developed at that time but often because of war they were not feasible. This contributed to the search for the component's function rather than other components. This resulted in Without any reduction in output being pursued, this method created cheap goods. At the end of the war, the technique was used both in terms of removing unnecessary costs from goods and to improve the development process, and hence in terms of feature analysis-based, gave birth to VM [5]. Australia, China, Japan, and the UK are examples of countries that have dramatically changed the VM methodology so that it can adapt to the culture and market of their country. Compared to Saudi Arabia, the American VM approach has been implemented without significant difficulties [6]. In Malaysia, the Economic Planning Unit made implementation of VM mandatory for all public projects exceeding RM 50 m [7]. Coetzee [8] states, however, that in the South African construction industry this approach must still be fully adopted by the parties concerned.

A similar situation in Nigeria's construction industry was reported by Oke and Ogunsemi [9]. VM is a key component of project efficiency, quality for the customer and the growth of infrastructure in the construction industry of developed countries [10]. In the meantime, VM has not been fully integrated into the processes of the construction sectors of developing countries [11]; [12]. VM usage in construction projects offers essential value for money in the production of infrastructure. The infrastructure itself requires enormous capital expenditure, resulting in large fixed costs for each business [13]. The incentive to invest capital in infrastructure depends on the value and benefit generated by this investment. Maximizing capital investment returns requires tools and techniques that allow alternative ways to fulfill the functional needs of customers to be identified at the minimum possible cost. The benefits of VM adoption are commendably known in all aspects of a country's economy. The effectiveness has been shown in solving several problems in the construction industries of countries such as United States, United Kingdom and Australia [14].

One of the advantages of VM adoption is that it saves money by reducing excessive capital and operating costs. Yu et al. [15] announced that the US government had approved its use in federal projects based on VM's potential cost-saving and, in turn, provided the VM protocol. Padhye [16] observed that VM, a standardized and innovative solution technology, is an excellent solution to the extremely difficult challenge that has arisen because of economic globalization and customer satisfaction. Mariathasan [17] considered VM as a mechanism that allows all parties to participate in decision-making in a proposed construction project. The VM protocol calls for a review of all available options to design and build the plan, resulting in the design brief being strengthened and any budgetary constraints established [18].

VM was a service that maximizes the quality of a project by administering its design from commission to completion by auditing all customers determined decision-making against a value system. Looking at this report, Short et al [19] refer to the core VM concept as including a structured and coordinated strategy, multidisciplinary, role evaluation, start-up and implementation of functional work, best value, total overall project cost, and investment return. Therefore, VM was described by Oke and Ogunsemi [20] as a systematic and multidisciplinary mechanism for evaluation of project functions from its inception through completion (through auditing or review) in order to obtain the best possible value-for-money and return on investment at the lowest possible total life cycle price. In view of improved construction and the use of the capital, this research evaluated the potential drivers and successors of VM practice in the study area.

2. Review of related literature

2.1. Definition of value management

In the construction industry, various researchers and practitioners engaged throughout VM use. Male and Kelly [21] have described VM by managing the development from conception to use as "an effective, innovative, problem-solving or trouble-seeking service that maximizes the functionality of a project." The process uses organized, team-based activities that provide and test existing or developed
problem solutions based on the customer's quality requirements. In addition, the American Value Engineers' Society (SAVE) [22] defined VM as an attempt to evaluate the functions of the projects to achieve the best value at the lowest overall life cycle expense. Both concepts suggest that VM enhances the delivery of the product through a value-for-money approach to the project and also facilitates collaboration by strengthening the working relationship among the team. A recent description of VM notes that the project management tool is a systematic and methodological method that uses a complex and multi-disciplinary method of evaluating the functions of elements or items throughout the life cycle to achieve best functions in exchange for cost-effectiveness and enhanced returns at the lowest possible expense [17].

2.2. Value management process
Seeley [23] was of the opinion that VM could be performed at any point in the design process to supplement the cost planning process in construction. Nevertheless, according to Ahuja and Walsh [24], VM is more successful for improving the possibility to streamline the project. Ellis et al. [25] have indicated that the majority of professionals would like to engage at an early stage in the VM system to find the business case or the basic project needs. The Department of Housing and Works [26] also indicated that the benefits of VM technology were strongest early in development projects, with performance enhancement that outweighs time and effort. This is especially the case if the plan is implemented during the design stages, as the design phases go beyond the design stage with a substantial declining ability to influence final project outcomes.

Dallas [27] said that VM is working throughout the project to coordinate structured workshops. The first is mostly at the concept stage (early stage) and involves reconciliation of the different views of the stakeholders to ensure that the right project is in place to meet the needs of customers. Though this is the case, Clifford [28] noted that VM is able to go through all phases of a construction project, and at times, depending on the requirements of the client and the project cost, there are up to one, two or three VM exercises per task. Contrary to common belief, VM activities can often be most effective if the problem appears to be insurmountable or if the difference of opinion is irreconcilable. A Clifford VM Workshop [28] is the process by which a project concept statement is to be established and feasibility studies are to be prepared to enhance the definition of capital projects. It can also be used in a specific way, such as analyzing layout possibilities, assessing construction strategies, choosing sites and deciding on access points.

Ellis et al. [25] contend that a VM workshop setting brings project partners together and that there is always coordination by facilitators with customers beforehand. VM Workshop format was created for the Society of American Value Engineers (SAVE) [22] tracking sequential data, structural analysis, creational, assessment, development, presentation stage phases, sequential information process phases. The workshop will encourage selected team members to discuss the project [25]. This process leads to the question of: What is an element? What does it do? What is it doing? What else can it do? What else could it do? What is it? What else can it do? What is it? What good is it? Once applied, multiple alternatives are drawn up and the best cost-effective alternative is drawn up.

3. Critical success factors of value management implementation
Enhancing the quality of construction projects requires the use of certain tools and techniques. Knowledge of these methods makes it very possible to achieve the desired quality. VM is a methodology that requires the use of techniques that allow the value for money to be increased. In addition, other drivers are identified while reviewing the related literature to evaluate the drivers which can lead to better use of VM in the construction sector. Rockart [29] described CSFs as "areas where, if satisfactory, the results will guarantee the organization's competitive success.” As such, the management process has been improved with [30-31]. CSFs can also be seen as vital fields for management planning and intervention to ensure performance [32]. Therefore, CSFs are regarded as actions and practices that should be taken to ensure that quality management among construction industry stakeholders is implemented effectively.
The literature review showed that various CSFs could be recognized as central to the successful implementation of value management, which is also essential in order to succeed in construction projects. The multidisciplinary mix of a VM group was described in the workshop by Ramly et al. [33] and Shen et al. [34]. The abilities of the VM facilitator are seen in Male et al. [21] as a CSF of VM while Chen et al. [35] also identified the facilitator as a major factor of performance in a VM lab. Palmer et al. [5] noted in this vein that the facilitator's expertise and qualifications represent a major factor in VM performance. In addition, CSF of VM also offers active support and participation to the customers [33] through decision-makers at the VM workshop [21]. In Nigeria, Sabiu and Agarwal [36] showed that the constraints impeding the adoption of VM in the country could be minimized by construction professionals and the State. Table 1 displays the VM CSFs from previous studies and the opinions of fifteen VM and building project experts in Egyptian construction industry. Different conclusions are drawn from each study based on the findings of this research work on the impediment factors for the elements which could contribute to the development of VM in developing countries. It can, therefore, be said that due to the similarities in the implementation of projects by these developing countries, similarities in the factors that lead to their adoption of VM are likely to be observed.

| S/N | Factors                                                                 | Source                                                                 |
|-----|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| 1   | Multidisciplinary VM team                                               | [33];[34];[21]                                                          |
| 2   | Competence of VM Facilitator                                            | [33];[35];[21];[5]                                                      |
| 3   | Effective communication among participants                               | [37];[13]                                                              |
| 4   | Ability to conduct VM workshop                                          | [38]                                                                  |
| 5   | VM participants awareness and experience                                | [33];[34];[21]                                                          |
| 6   | Commitment of all stakeholders to VM workshop                           | [33];[34]                                                              |
| 7   | Professional knowledge and experience of participant's respective disciplines | [34]                                                                     |
| 8   | Willingness to accept changes and new innovations                       | [34]                                                                  |
| 9   | Clear definition and scope of different professionals                  | [37]                                                                  |
| 10  | End-user participation                                                  | [33]                                                                  |
| 11  | Ability and personality of participants                                 | [38]                                                                  |
| 12  | Good coordination and working ties between the investors and agencies   | [13];[34]                                                              |
| 13  | Participants’ discipline and behaviour                                  | [33]                                                                  |
| 14  | Clear and established goals of participants of workshop                 | [37]                                                                  |
| 15  | Authority to make decisions by their respective organization given to each participant | [33]                                                                     |
| 16  | Client value system development and clarification                       | [39]                                                                  |
| 17  | Motivate VM team members to produce VM output                           | Added by interviewees                                                   |
| 18  | Proactive, creative and structured approach                              | [34]                                                                  |
| 19  | Analysis of project elements and functions                              | Shen and Liu (2003).                                                   |
| 20  | VM feedback mechanism                                                   | [34]                                                                  |
| 21  | Awareness on the part of clients on value optimization role of VM       | [40]                                                                  |
| 22  | Suitable feedback from the original design team                         | [5]                                                                   |
| 23  | Adequate timing of VM workshop                                          | [34]                                                                  |
| 24  | Background information collected                                         | [33]                                                                  |
| 25  | Orientation meeting                                                     | [13]                                                                  |
| 26  | Creatively motivating brainstorming approach                            | Added by interviewees                                                   |
| 27  | Using new technological tools to speed up creativity and evaluation     | Added by interviewees                                                   |
| 28  | Intervention in project development cycle of VM workshop                | [33]                                                                  |
Qualitative study

Different interviews with industry experts were conducted to gain an understanding of the above factors which could affect the implementation of (VM) in construction projects. Before the data collection started, the interview instrument was pilot tested. The semi-structured interviews took place face-to-face for 50 to 90 minutes, with a series of open questions, since the approach to explore further information on the subject is highly recommended. The interviews are audio-captured (with permission of the interviewees) and transcribed for analysis to ensure the accuracy of the study. The data was analyzed manually due to the small number of interviews, and the use of sophisticated data analysis technology was viewed as unnecessary. In the interviews, a clear path was established in the wider project in keeping with the perception of (VM) driver variables in the Egyptian context. The semi-structured interviews were developed based on the implementation factors (VM) found in previous studies in the construction industry. Interview practitioners and specialists argued that the implementation of VM in projects had to be driven by a more formal system.

4.1. Demographic information

The selection process started by approaching several private and public construction firms for help in identifying appropriate interviewees. Fifteen (15) face to face interviews with Egyptian professionals, experts, construction project specialists, and project management was conducted to ensure better results and performance. The participants were chosen on three levels: years of experience, education level, and position, and it shown in Table 2 that they had an ample of experience in the construction industry, ranging from nine to 40 years. The experts interviewed included four government professionals, five private sector practitioners, and six experts from the consulting industry. Their positions were also varied, including site engineer, consultant, project manager, senior manager, and director. They have been working in the government, private and independent agencies, while its main functions include all key players in the industry, customers, suppliers or contractors, ensuring rich knowledge from a wide range of perspectives.

Table 2. Semi-structure interviewees' profile.

| NO. | Position               | Education | Experience | Sector       | Organization   |
|-----|------------------------|-----------|------------|--------------|----------------|
| 1   | Director               | PhD       | 30         | Private sector | Contractor     |
| 2   | Project manager/Professor | PhD     | 28         | Government   | Client/Developer  |
| 3   | Senior Quantity surveyor | MSc     | 20         | Government   | Consultant     |
| 4   | Senior director        | BSc       | 24         | Private sector | Client/Developer |
| 5   | Principle consultant/Professor | PhD | 40         | Independent | Consultant     |
| 6   | Senior project manager/Associate Professor | PhD | 30         | Independent | Consultant     |
| 7   | President/Professor    | PhD       | 35         | Independent | Consultant     |
| 8   | Architect              | MSc       | 15         | Government   | Client/Developer |
| 9   | Civil& Structure/Associate Professor | PhD | 28         | Independent | Consultant     |
| 10  | Civil& Structure       | MSc       | 12         | Independent | Consultant     |
4.2. Interviews Results and findings

The researcher, who has become familiar with the transcript and any findings that have been made on a particular interview and the list of literature factors, asked if they took into consideration the relevant factors or whether there were any current factors which were insignificant or suggested other factors that they found important but not mentioned. As a result, several variables have been changed and a few have been added to the list. To develop the main questionnaire, the updated and added variables were used. The researcher has immediately written his impressions of each face-to-face interview. The notes for the interviews were typed and added to the corresponding files of the transcript. The data has then been coded and stored in a separate folder so that interview material can be analyzed. This has been achieved and the main definition can be simplified and systematized that can then be converted into key features in all VM-related factors. Some issues are posed to each interviewee more often than others, which is significant since they show their relationship with the field of expertise.

The variation in the relevance to each subject according to the field of expertise of the respondent is important to note. The role of the private sector participants is more linked to lower costs while maintaining the value of their projects. During interviews, the role of the participants themselves, after the first phase of project development, is more concerned with organizational issues. The participants had their thoughts on the role of the VM in their organization, the macro and microclimate of their company’s ventures, and how it can or does effect raising project profit margin, raising project cash flow, reducing variation costs, delivering the project on schedule, supplying the project to shorten the time required to implement variation orders and enhancing specification enforcement. This effect involves improving the profitability margin. Nearly all surveyed participants felt that the introduction of VM has an impact on the working environment and the main problem with VM should be properly implemented and not done informally at the early stage of the design process. The findings from these interviews indicate that the factors listed in the previous studies were appropriate and suggested new factors relating to VM factors described in Table 1. The new factors were identified and these factors are:

a) Motivate VM team members to produce VM output

The motivation for the members and stakeholders of VM workshop can enhance the results and improve the performance of the project. Unless VM is to be fully implemented in the construction industry, the stakeholder considerations need to be taken into due account. Aigbavboa [13] argued that stakeholders’ issues contribute to the major challenges of implementing VM in construction. In order to achieve the implementation of VM, it will be very important that these players learn how important it is to take new ideas rather than stick to the traditional project delivery method. Jaapar [41] noted that it is a major impediment to the VM used to improve the work culture of construction professionals. Furthermore, poor relationship and communication among relevant stakeholders, unwillingness to entertain new ideas and concepts, and lack of readiness to adopt VM in the industry are bound to also be a barrier considering the fragmented nature of the construction industry [42].

b) Creatively motivating brainstorming approach

In the creativity phase, the VM team will focus on alternatives that would improve operations, maintain or improve safety, reduce costs if possible, and satisfy the local stakeholders [43]. While
brainstorming technique has been the main tool for VM’s idea generation it has some limitations [44]. In the attempt to enhance brainstorming effectiveness, the new tools and techniques should be integrated with creativity phase to improve the ideas by enhancing the mind of the group member of VM workshop.

c) Regular attendance of decision-maker
   The regular attendance of the decision-makers can highlight the interest of top management and decision makers members regarding the VM study and recommendations. Hayatu [45] found the lack of incentives to support the use of VM in public projects as an important challenge to VM in the Nigerian construction industry through proper policy-making. In Malaysia, as Lai [46] noted, a similar situation exists. Mohd [47] stated that without the support of top management VM would be unlikely to succeed and demonstrate its important contribution. Thus, Al-Yami [48] suggested that the support of top management was essential to implement the VM exercise recommendations so that a successful project could be achieved.

d) Using new technological tools to speed up creativity and evaluation
   Technology represents a major issue at this time. Therefore, it is important to the VM team that the VM team be interdisciplinary to alleviate this inherent difficulty during a VM workshop and that the members are so highly qualified as to adapt their skills and expertise to the particular project. Moreover, Coetzee [8] advocated the need to embrace technological advancement and employ same in carrying out VM activities. This can be done through the use of electronic means of conducting VM, which will save cost and time spent in gathering participants together.

5. Conclusion
   This research aims to identify the factors and delivers to adopt VM in developing countries to prevent and increase the use of the method within the construction industry by providing possible measures to prevent this. The study was carried out in the Egyptian construction sector, through interview with fifteen experts directly involved in construction, particularity in building projects. Experts were also selected on the basis of the expectation that they must have participated in project delivery, particularly in the construction of building projects by contractor, consultant, and client entities. The results achieve the aim of this study and suggest ways to increase the use of VM in the construction industry with a view to achieving better-quality construction and value for money. New factors appeared in this context that were not mentioned in the previous studies. It can therefore be concluded that the new suggestion factors from the study can effectively encourage the adoption on VM by the country and also other developing countries, as they face similar problems and need similar drivers in promoting the adoption of VM in the building project when these projects are carried out by similar style, and method.

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