

# The Impact of Team Size and Workshop Duration on Value Engineering Proposals

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## Abstract

The paper assessed 28 Value Engineering (VE) reports of studies conducted by third party VE consultants on Saudi Aramco capital projects from January 2020 to August 2022. The findings indicate that there is an inverse relationship between accepted number of VE proposals and the size of the workshop review team (the larger the team, the smaller percentage of accepted proposals). It, also, showed that accepted number of VE proposals is not influenced by the duration of VE workshops. The paper recommends the optimization of the size of VE teams and optimized workshop durations to be aligned to Saudi Aramco (SA) capital management system project classifications. The recommendations may result in increasing the number of quality accepted VE proposals while reducing the cost of VE workshops.

**Keywords:** Saudi Aramco, Team Size, Workshop Duration, Value Engineering Proposals.

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## INTRODUCTION

The Project Optimization Division (POD) of the Project Management Office Department (PMOD) is responsible for conducting Value Engineering studies on Saudi Aramco's capital projects. As per Saudi Aramco procedures, it is mandated to implement at least one VE study on SA capital projects with estimated costs exceeding 30-million US dollars. The Society of Value Engineers (SAVE) International defines a value study as "the application of the three stages of the Value Methodology (pre-workshop, workshop, and postworkshop) in a structured effort led by a Certified Value Specialist (CVS) to improve the value of a project, product, or process."

Value Engineering studies, for SA, are mainly facilitated by inhouse professionals who have the training, experience and certifications to lead VE studies effectively. Due to the cyclical nature of capital projects, there are times where internal capabilities are limited in addressing unplanned VE studies. To bridge this gap, POD approved a list of third-party consultants that can be contracted to facilitate specific VE studies on an as needed basis.

To assure the quality of VE studies facilitated by third party consultants, POD conducts regular reviews

of VE reports generated by third party consultants. The reviews of consultants' reports are based on the requirements specified by Saudi Aramco procedures. Any deviations or gaps are identified as areas for improvement. Improvement observations are either communicated to the third-party consultants to enhance their performance or incorporated in updated SA procedures.

The latest reviews led to interesting observations regarding the influence of VE team size and workshop duration on the acceptance of VE proposals. SAVE International defines VE workshops as "the application of the eight phases of the Value Methodology (VM) Job Plan (1. Preparation, 2. Information, 3. Function Analysis, 4. Creativity, 5. Evaluation, 6. Development, 7. Presentation, and 8. Implementation) to a project, product, or process by a multidisciplinary team led or facilitated by a Certified Value Specialist." Also, it defines VE proposals as "recommendations, resulting from the application of the Value Methodology Job Plan during a value workshop, to increase the value of a project, product, or process so as to improve function and/or decrease the resources required. It is a deliverable of the Development Phase of the VM Job Plans." Accepted VE proposals are the main products of VE studies. The VE ideas generated during the creativity

phase and passing the evaluation criteria are developed into VE proposals. Then, stakeholders accept or reject the implementation of the proposals. In SA, the number of accepted VE proposals is used as a measure for the effectiveness of VE studies.

It is assumed that the larger the size of the VE team and the longer the workshop duration, more accepted VE proposals should be the outcome. However, this paper was developed to assess these assumptions. The objective of this paper is to evaluate the influence of VE team size and workshop duration on the acceptance of VE proposals. To do so, 28 VE reports were reviewed to provide recommendations for the number of VE team members and workshop duration of VE studies implemented on Saudi Aramco capital projects for third-party led studies as well as internally led studies.

### Data

The data used for the assessment were collected from VE reports with the following criteria:

- VE Reports Drafted by Approved third-party VE Consultants.

POD's approved list of third-party Value Improvement Practices (VIP) consultants has a total of 48 professionals who meet the criteria set by SA procedures. Only 13 of the consultants are approved to lead VE studies on Saudi Aramco's capital projects. The rest are either conditionally approved (7) or not approved (28) to facilitate VE studies.

- VE Reports Drafted by In-Kingdom third-party VE Consultants.

There are six consultants stationed in Saudi Arabia and seven consultants have out-of-Kingdom offices across the globe. Since the majority of VE studies conducted by third-party consultants are held in the Eastern Province of Saudi Arabia, the focus of the study will be on VE reports drafted by in-Kingdom third party consultants.

- VE Reports Dated from January 2020 to August 2022.

There is a regular cycle to review VE reports and use the outcome to provide feedbacks to third-party VE consultants in addition to update SA procedures. The period from January 2020 to August 2022 is aligned with the cycle and contributes to other ongoing improvement activities.

- VE Reports Saved in POD Knowledge Repository.

The focus of the assessment is on (32) VE reports that are submitted to POD as final drafts. Other VE reports that might be in the process of drafting or review by stakeholders and not in a final format were not part of the assessment.

- VE Reports with Complete Team Size and Workshop Duration Information.

The assessment eliminated VE reports that have missing information related to team size or workshop duration.

The use of filtering criteria resulted in the identification of 28 VE reports that were used for the assessment of the influence of VE team size and workshop duration on the acceptance of VE proposals.

## RESULTS

The key findings of the assessment are as follows;

- The majority (94%) of the VE studies are conducted by two of the third-party consultants.

The review of the (32) VE reports indicated that only four out of the six VE consultants are facilitating VE studies for SA (Figure 1). Consultant #1 and #2 facilitated 19 and 11 VE studies respectively. Consultants #3 and #4 facilitated one VE study each while consultants #5 and #6 did not facilitate any VE study for SA.

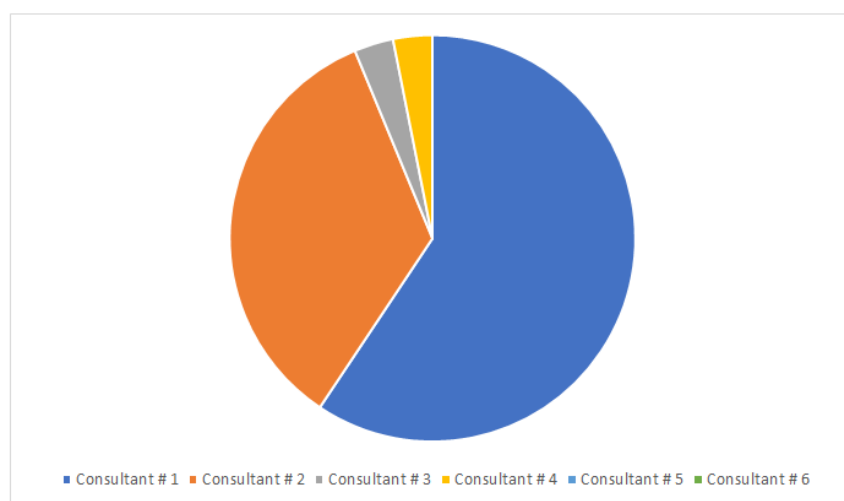
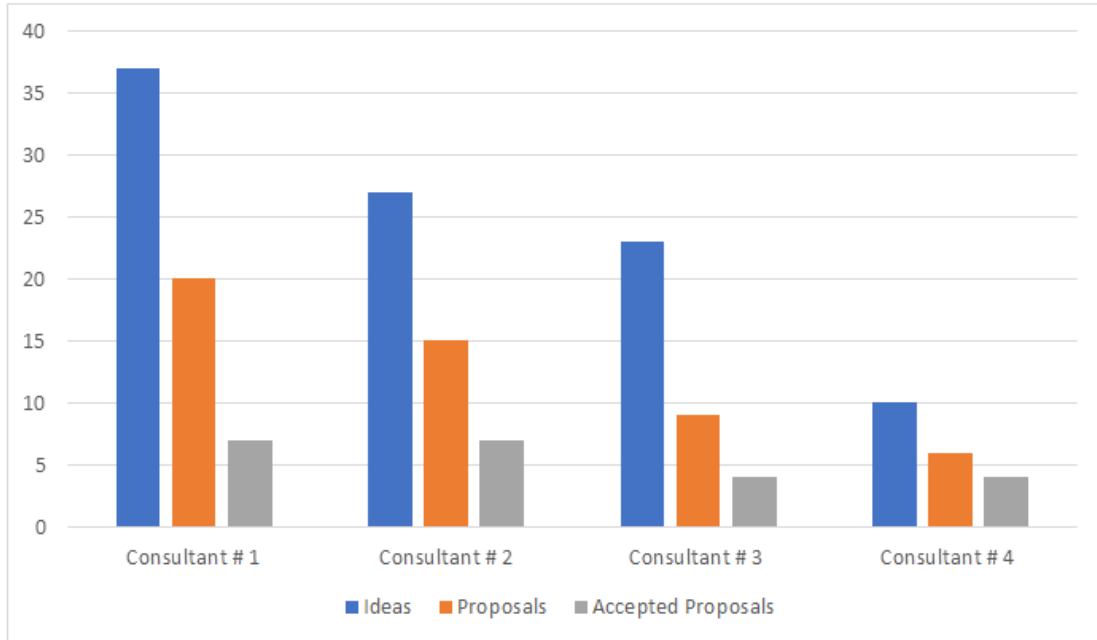


Figure 1: Number of Ve Studies Per Third Party Consultant

- The Average Number of Accepted VE Proposals is the Same for Studies Facilitated by Consultant #1 and Consultant #2.

The VE studies facilitated by consultant #1 resulted in a greater number of ideas and proposals than

the ones lead by consultant #2 (Figure 2). However, the average accepted VE proposals resulting from the facilitation of the two consultants are the same. This might suggest a weak correlation between the number and quality of the generated ideas.

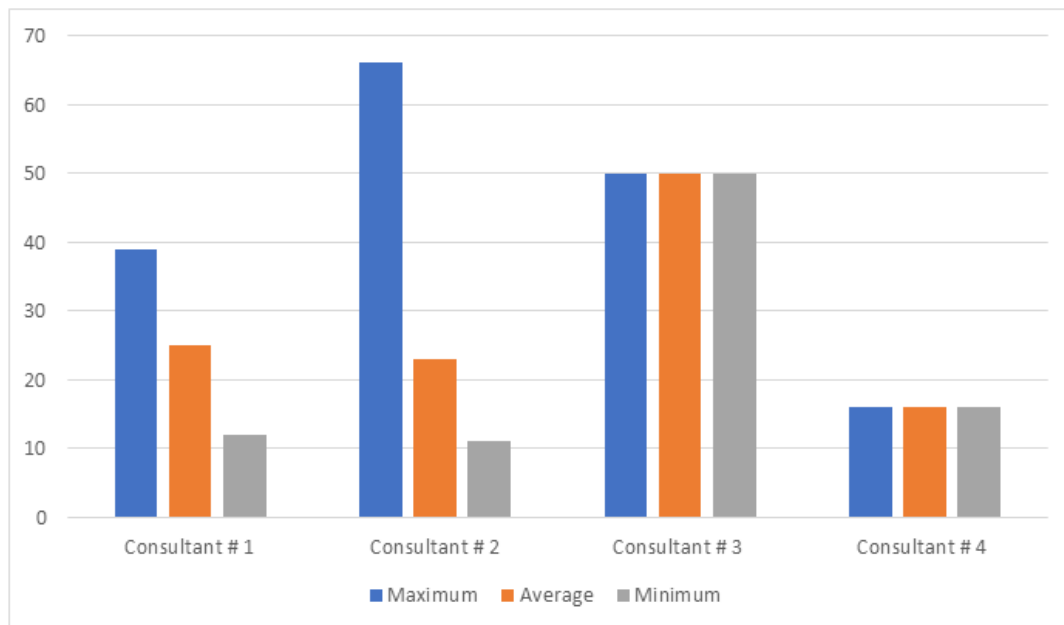


**Figure 2: Average Ve Ideas, Proposals & Accepted Proposals**

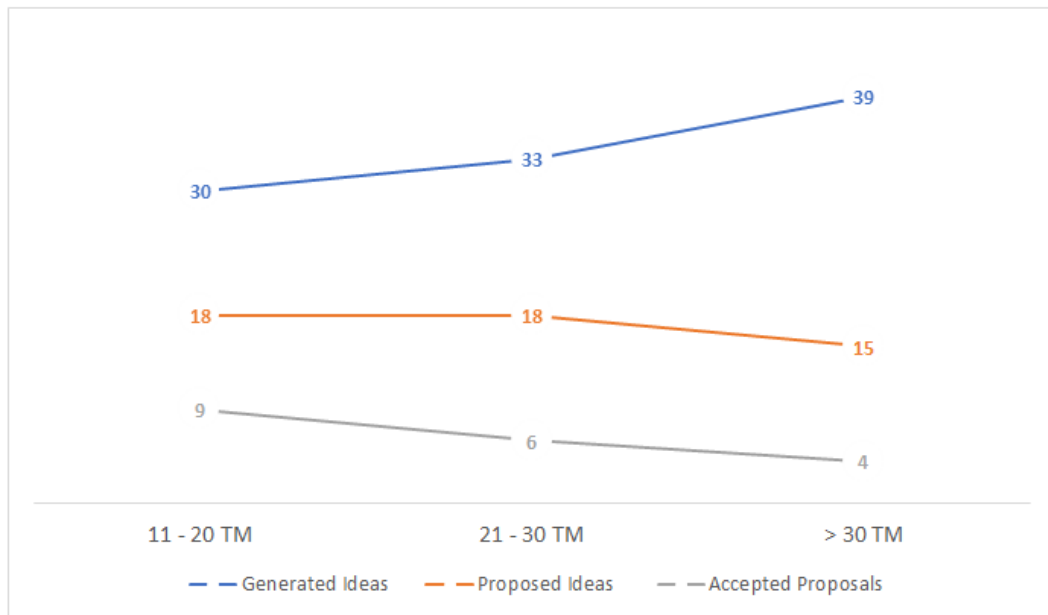
- Size of VE Teams Ranged from 11 to 66 Members

The average size of VE teams is 25 members while the minimum and maximum are 11 and 66 members respectively (Figure 3). Although there is a

general assumption that the larger the number of team members the more VE ideas and proposals brainstormed and developed. However, small size (11 – 20) VE teams generated less VE ideas but more accepted VE proposals than large size (> 30) VE teams (Figure 4).



**Figure 3: Size (Members) of Ve Team**

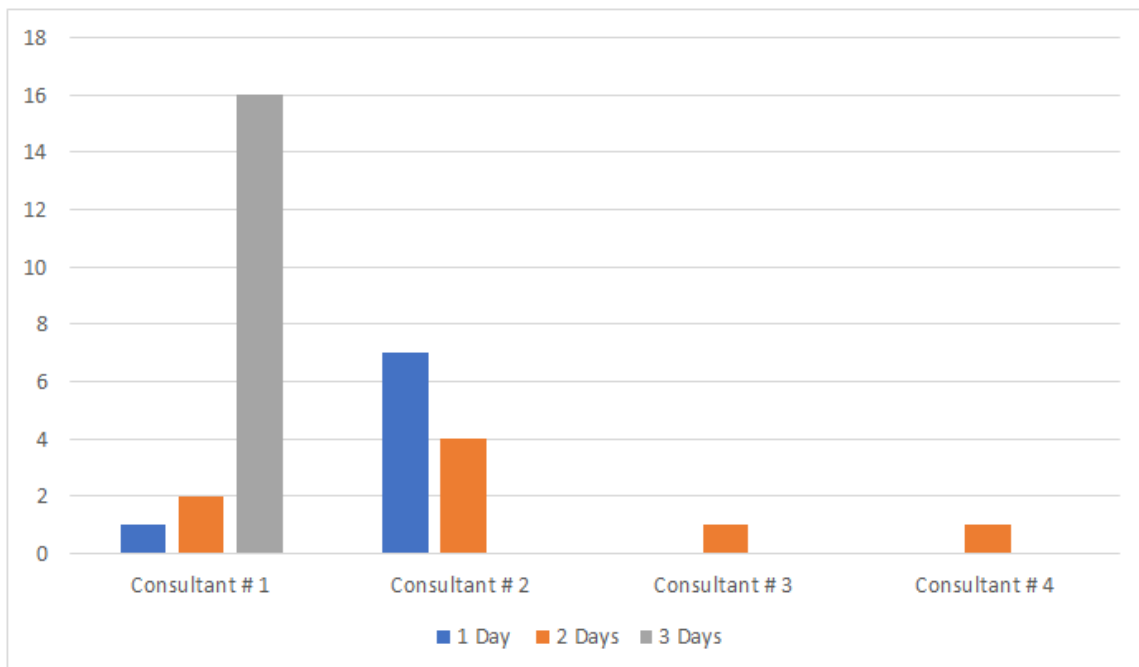


**Figure 4: Average Number of VE Ideas Versus Number of Team Members (TM)**

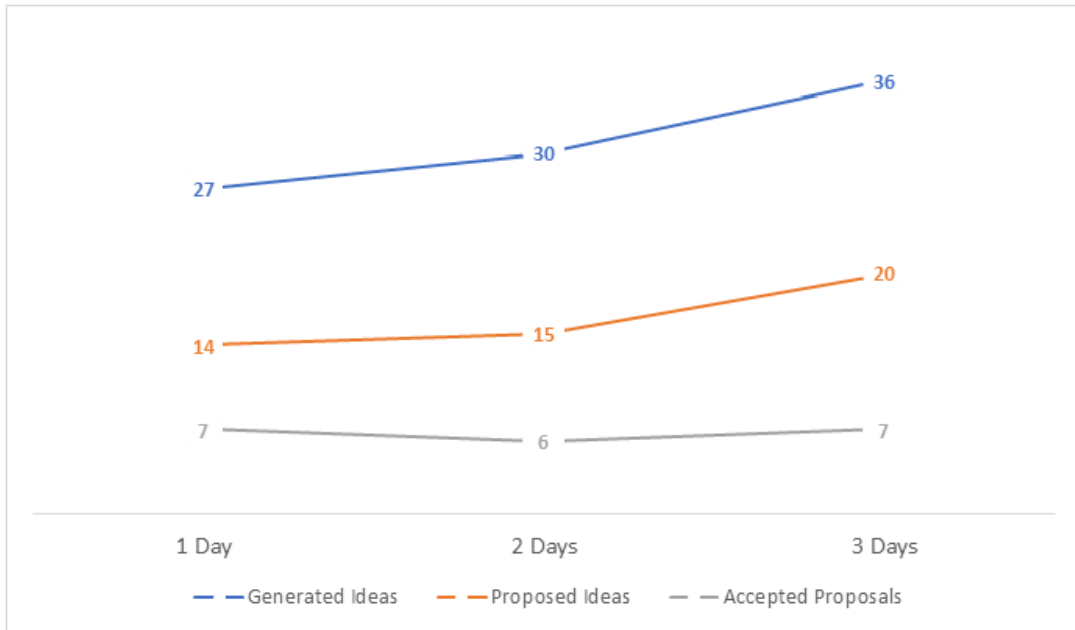
- Duration of VE Workshops ranged from one to three days.

Half of the (32) VE reports indicated VE workshops were conducted in three days (Figure 5). The other half reflected equal percentages of VE workshops conducted in one and two days. Although, SA procedures

recommend the implementation of VE workshops in three to five days. The consultants managed to get a decent number of VE ideas and proposals in studies of less duration. Figure 6 shows that the longer the VE workshop the more the generated VE ideas. The number of accepted VE proposals is almost the same for VE workshops of different durations.



**Figure 5: Duration (Days) of Ve Workshops**



**Figure 6: Average Number of VE Ideas Versus Workshop Duration (Days)**

**RECOMMENDATIONS**

The key recommendations are as follows;

- Optimize the Size of VE Teams.

The results indicated that the average number of accepted VE proposals is more for small size VE teams than large size teams. So, it is recommended to set a cap for the maximum number of attendees for VE teams.

- Optimize the duration of VE Workshops.

The results indicated that the average number of accepted VE proposals is not influenced by the duration of the VE workshop. Workshops of short durations gives the same results as workshops of longer durations. So, it is recommended to optimize the duration of VE workshops specified in SA procedures.

- Align VE Team Size and Workshop Duration with Saudi Aramco Capital Management System Projects Classification.

Saudi Aramco capital projects are classified into four groups based on project size cluster threshold values and project complexity criteria. Due to confidentiality, the classes will be numbered in this paper as I, II, III and IV. Where class-I represents projects with highest cost and complexity and class-IV represents projects with lowest cost and complexity.

The recommendation, summarized in Figure 7, calls for specific caps of VE team size and workshop duration that targets the various projects classifications.

		Projects Classification			
		I	II	III	IV
Maximum Team Size (Members)		30	25	20	15
Maximum Workshop Duration (Days)		4	3	2	1

**Figure 7: Recommended Team Size and Workshop Duration**

The implementation of the recommendations will enhance the effective communication among team members and optimize the cost of VE workshops. As per Project Management Institute Body of Knowledge (PMBOK), the number of team members (n) have great influence on the number of communication channels

[n\*(n-1)/2]. For example, if the number of VE team members reduced from 66 to 30, the number of communication channels will reduce by 80%. In addition, the cost of VE workshops is directly related to team size and workshop duration. When team members

are reduced from 66 to 30, the cost of VE workshops will be reduced by more than 50 percent.

## SUMMARY

POD's unlimited commitment towards excellence is fueling its continuous efforts to study performance and identify areas for improvement. This paper presents the latest attempt to assess the performance of third party VE consultants who support the facilitation of SA capital projects. Some observations underlined the need to assess the influence of VE team size and workshops duration on the average number of accepted VE proposals.

It was assumed the number of accepted VE proposals is directly proportional to the number of VE team members and workshops duration. The assessment of the 28 VE reports indicated that the accepted number of VE proposals is inversely related to the VE team size and is the same for workshops of various durations. This led to the recommendations of optimizing VE team size and workshops duration and the alignment to SA capital management system requirements. The implementation of the recommendations might result in higher number of accepted VE proposals and lower cost of VE workshops.

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