

Improving Sustainability Concept in Developing Countries

The Influence of Value Engineering and Sustainability considerations on the Project Value

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Abstract

Value engineering is a powerful approach for cost saving and quality improvement; especially that the construction industry holds a significant weight with respect to the worldwide economy. Currently, value engineering does not influence just project costs and quality, but also it proved to have positive impacts on the environment and the worldwide trend of green construction. Value engineering takes into consideration both the initial and life-cycle costs. Sustainability is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The sustainability approach deals with all the surrounding resources such as water, energy, material lifecycle from its beginning as raw materials till their salvage cycle. This paper presents a case study of value engineering applications in the aforementioned sustainability disciplines in a real large-scale residential project. In this case study, the methodologies and calculations of the value engineering and sustainability studies are presented. The overall estimated savings of the project resulting from the full value engineering study ranged between 20% to 30% percent of the element cost; hence a significant reduction in the overall project cost as well as the saving in energy consumption that reached about 7%. The paper provides a good example on how value engineering and sustainability are inter-related; and how they have compounded economic and environmental impact when studied in parallel.

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1. Introduction

Historically, Project value where primary communicated in monetary terms, as a ratio of costs to benefits. Later other researches defined value in terms of use, exchange/replacement, esteem value and cost. In construction projects

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value can be looked at from owner or end user side. Project value has a utility dimension with an intrinsic property to satisfy [1]. Value Engineering (VE), also referred to as Value Methodology (VM) or Value Analysis (VA), is a systematic process to improve the value of a project through the analysis of its functions. Value is defined as a fair return or equivalent in goods, services, or money for something exchanged [2]. In other words, value is the ratio of function to cost; where the value is increased by either increasing the function or reducing the cost, or by both. Value Engineering was conceived in the days of World War II in the 1940s by Lawrence D. Miles; who was at that time the purchasing department manager at General Electric, which was a major defense contractor having shortage of strategic materials needed to produce their products due to the war. Mr. Miles formulated the concept of function analysis, which is the key foundation of VE. Mr. Miles studied the functions of products, and he indicated that clients purchase products either for the work they perform or for their aesthetic merits. So he investigated alternatives for the purpose of increasing the value while achieving the same functions without compromising the quality [3].

Climate change is a fact that have been discussed since decades when first time discussed in a scientific paper in 1827 [4]. In 1988 the IPCC (Intergovernmental Panel on Climate Change) was established to address the climate change issue and prepared assessment reports about the state of scientific, technical and socioeconomic economic knowledge on climate change including its cause's as well potential impacts and the required response strategies. Residential buildings are responsible for major energy consumption in Egypt where 45% of its population lives in urban areas. In 2009/2010 residential buildings consumed nearly 48% of the total nationally generated electricity [5].

In Egypt Many researches and scientific papers discussed the climate change issue, however the pace of climate change has accelerated globally in the last decade, at the same time economic, social and political disarray in Egypt in last few years threatened the achievement of a sustainable development. The combination of these factors has a dramatic effect on people and economy if not taken into consideration during the design and construction process.

Nomenclature

EEC	Egyptian energy code for residential buildings
FLC	foamed lightweight concrete
VE	value engineering
XPS	extruded polystyrene

1. VE Methodology

For any certain project, the VE study is applied by a multidisciplinary team to improve its value. SAVE International sets 6 sequential phases for performing a successful VE study. The phases are distributed in 3 stages; pre-workshop stage, workshop stage, and post-workshop stage. The methodology of the SAVE International VE studies, including stages and phases, is shown in Figure 1.

The scope of this paper covers the phases of the workshop stage (stage 2); which are the most technical stage in nature. VE study Phases in stage 2 are:

- Information Phase
- Function Analysis Phase
- Creativity Phase
- Evaluation Phase
- Development Phase
- Presentation Phase

The study went through the 6 phases of the VE study although the paper will highlight the Development Phase which is the most critical phase for any VE study.

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