



Cairo University

# **EXPLORING CONCEPTUAL LINKAGES BETWEEN VALUE ENGINEERING AND SUSTAINABLE CONSTRUCTION**

By

**Ahmed Badawy Hassan**

**A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the degree of  
MASTERS OF SCIENCES  
in  
ARCHITECTURE ENGINEERING**

**FACULTY OF ENGINEERING, CAIRO UNIVERSITY  
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**Prof. Dr.**  
**Emad Aly El Din El Sherbiny**  
Professor of Architecture  
Department of Architecture  
Cairo University

**Dr.**  
**Tarek Nasr Eldin**  
Department of Architecture  
Cairo University

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**Approved by the Examining committee**

<b><u>Prof. Dr. Emad Aly El Din El Sherbiny</u></b>	<b><u>Main Advisor</u></b>
---	----------------------------

<b><u>Prof. Dr. Mohamed Reda Abdalah</u></b>	<b><u>Member</u></b>
--	----------------------

<b><u>Prof. Dr. Sherif Sabry Al Attar</u></b>	<b><u>Member</u></b>
---	----------------------

**FACULTY OF ENGINEERING, CAIRO UNIVERSITY  
GIZA, EGYPT  
2014**

**Engineer:** Ahmed Badawy Hassan Hassanin  
**Date of Birth:** 12/01/1982  
**Nationality:** Egyptian  
**E-mail:** zgroub2005@hotmail.com  
**Phone:** 01001462200  
**Address:** 1 Ahmed Al Sakandary ST. –  
 Misr Al Gadida - Egypt.  
**Registration Date:** 01 /10/2011  
**Awarding Date:** - /-- /----  
**Degree:** Master of Science  
**Department:** Architectural Engineering  
**Supervisors:** Prof.Dr. Emad Aly Eldin El Sherbiny  
 Dr. Tarek Ibrahim Nasr Eldin  
**Examiners:** Prof. Dr. Mohamed Reda Abdalah  
 Prof. Dr. Sherif Sabry Al Attar  
 Prof.Dr. Emad Aly Eldin El Sherbiny



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 Cairo University  
 Cairo University  
 Fayoum University  
 Cairo University

**Title of Thesis: Exploring Conceptual linkages between Value Engineering and Sustainable Construction**

**Key words:** best value, conceptual linkages, sustainable construction, value engineering

**Summary:**

Value Engineering is a systematic approach for achieving optimum value for money, while maintaining or improving quality, safety, reliability and maintainability. It is a problem-solving technique based on analysis of the project functions demanded by the owner in order to meet the end user's requirement and needs. VE uses multi-discipline teams to analyze a product design, an engineering concept or a construction approach. Sustainable construction is broadly created to explain the contribution of the construction industry to sustainable development. Literature suggests that the key targets for construction include: environmental impact reduction; cost minimization; social improvement; economic and cultural quality throughout the whole life of the project.

VE comprises powerful tools and techniques that can be used to adopt and diffuse sustainable construction principles amongst its team members. While concerns of sustainable construction dimensions are inherent in most VE studies, the level of consideration differs from study to another depending on the knowledge of team members. Further research is needed to establish the barriers that could impede the further integration of both subjects. More conceptual linkages must be developed, if an integrated approach to VE and sustainable construction are to emerge considering encouraging those who have the knowledge.

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# Nomenclature

VE	value engineering
SC	sustainable construction
GNP	Gross National Construction
LCC	life cycle cost
VA	value analysis
SOW	scope of work
VECP	value engineering change proposal
WBS	work breakdown structure
LCCA	life cycle cost analysis
USGBC	U.S. Green Building Council
BREEAM	Building Research Establishment Environmental Assessment Method
LEED	Leadership in Energy and Environmental Design
CASBEE	Comprehensive Assessment System for Building Environmental Efficiency
DGNB	Duetche Gesellschaft Fur Nachhaltiges Bauen
IEA	International Energy Agency
PENREN	the Pentagon Renovation Program
EPA	Environmental Protection Agency
CFC	Chlorofluorocarbon
HCFC	Hydro chlorofluorocarbon
VOC	volatile organic compounds
PVC	polyvinyl chloride
CCA	copper chromium arsenate
PBT	persistent bio accumulative toxic chemicals
ACQ	alkaline copper and quaternary ammonium
SCS	scientific certification systems
FSC	Forest Stewardship Council
EPS	expanded polystyrene
SIP	structural insulated panels
CMU	concrete masonry wall
PDA	personal digital assistant
IAQ	indoor air quality
HVAC	heating ventilation and air-conditioning system
STC	sound transmission class
HDB	the housing of development board
TBL	triple bottom line