

CERTIFICATION OF APPROVAL

**Implementation of Value Engineering within consulting practice in Malaysia**

by

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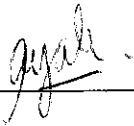
UNIVERSITI TEKNOLOGI PETRONAS

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## CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



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MOHD SYAHRIN B AB RAHIM

## ABSTRACT

Value Engineering (VE) is a well-established methodology for defining and maximizing value for money. It can be applied to any type of project regardless of size or timeframe and at all stages throughout the life cycle of the project from inception to completion. However, the implementation of VE is still low and not so popular especially during the design stage of a construction project. Therefore the main objective of this research is to identify the degree of understanding of VE among consultant firm and investigate the underlying reason that hinders the implementation of VE especially consulting practice in peninsular Malaysia. The scope of this research is focusing on the professional consultants and also the clients or the developer that involve in construction projects in Malaysia. This research used survey methods where questionnaire were posted to selected respondents all over Malaysia. The data collected from the questionnaire were analyzed using average index method. From the research, the degree of understanding among the respondents was above expectation. The factors that hinders the implementation of VE are lack of local guideline and info about VE, lack of knowledge and practice in VE, interruption to normal work schedule, and conflicting of objective by different parties

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# TABLE OF CONTENTS

<b>CERTIFICATION OF ORIGINALITY</b> .....	i
<b>CERTIFICATION OF APPROVAL</b> .....	ii
<b>ABSTRACT</b> .....	iii
<b>ACKNOWLEDGEMENT</b> .....	iv
<b>CHAPTER 1: INTRODUCTION</b>	
1.1 Background Studies.....	1
1.2 Problem Statement.....	2
1.3 Objective .....	2
1.4 Scope of Study.....	2
<b>CHAPTER 2: LITERATURE REVIEW</b>	
2.1 Introduction .....	3
2.2 Background of Value Engineering .....	3
2.3 Value Engineering in Construction.....	4
2.4 Value Engineering in Malaysia.....	6
2.5 Roles of Consultants in implementation of VE .....	7
2.6 Previous related work .....	8
<b>CHAPTER 3: METHODOLOGY</b>	
3.1 Survey process .....	9
3.2 Literature Review.....	10
3.3 Interviews.....	11
3.4 Tools and Analysis .....	11
3.5 Average Index ....	12

## **CHAPTER 4: RESULTS AND DISCUSSION**

4.1 Introduction .....	14
4.2 Pilot Survey Questionnaire .....	14
4.3 Questionnaire Collected .....	18
4.4 General Background / Information.....	18
4.5 Value Engineering.....	21

## **CHAPTER 5: CONCLUSION**

5.1 Introduction .....	28
5.2 Recommendation.....	29

<b>REFERENCE .....</b>	<b>30</b>
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## **APPENDICES**

- Planning Schedule and Overall Workdone
- Cover Letter
- Survey Questionnaire

## LIST OF TABLES

Table 4.1: The amount of questionnaire received from different location .....	18
Table 4.2: The questionnaire distribution to construction's companies.....	19
Table 4.3: Designation in the company.....	20
Table 4.4: VE Awareness.....	21
Table 4.5: VE information source .....	22
Table 4.6: Implementation of VE.....	23
Table 4.7: Project Implementation of VE.....	23
Table 4.8: Application of VE in stages of construction project .....	24
Table 4.9: Implementation of VE in future project .....	25
Table 4.10: Factors that hinders the implementation of VE.....	27

## LIST OF FIGURES

Figure 3.1: Methodology for FYP2.....	9
Figure 3.2: The output of the analysis using Microsoft Excel .....	12
Figure 4.1: The amount of questionnaire received from different location ...	19
Figure 4.2: The amount of questionnaire received from different firm.....	20
Figure 4.3: Designation of respondents.....	21
Figure 4.4: VE awareness .....	22
Figure 4.5: Level of understanding of VE .....	25
Figure 4.6: Implementation of VE in future project .....	26



## CHAPTER 1

### INTRODUCTION

#### 1.1 Background of Study

Value Engineering (VE) can be said as a proactive, creative problem-solving tool which is a strategic approach to achieving maximum value in a project consistent with the organization's broad business goals. It is a well-established methodology for defining and maximizing value for money. It can be applied to any type of project regardless of size or timeframe and at all stages throughout the life cycle of the project from inception to completion. Value engineering aims to achieve optimum value by providing the necessary functions at the least cost without affect to specified quality and performance.

However in Malaysia, VE is still not so popular due to the lack of knowledge and awareness of its existence and applications. VE can be considered still at its infant stage in Malaysia as only a small amount of construction projects have been known to apply VE so far.

Traditionally, construction projects in Malaysia have been developed by generating a program of needs, or hiring consultants to develop necessary design and drawings, and then commencement of construction projects by the contractor. Without the implementation of VE, the unnecessary costs may not be identified and removed. Consequently, the cost of a construction project will be high.

It is important to do research on level of implementation of VE among consulting practice in Malaysia, as this method can help the professional consultants reduce the cost without affecting the value of the project. The reason that discourage the implementation of VE can also be identified thus provide some suggestion to promote this method in consulting practice.

## 1.2 Problem Statement

Value engineering (VE) has been widely accepted internationally especially in the USA, Japan, European countries, and other developing countries such as Australia. In Malaysia, the level of implementation of VE is still low and not so popular especially during design phase of a construction project.

Therefore it is necessary to investigate the underlying reason of this current situation that hinders the implementation of VE among the consulting practice in construction industry in Malaysia. Why this approach is rarely applied in Malaysian construction industry and what are the factors that discourage its implementation?

## 1.3 Objective

- 1) To identify the degree of understanding of value engineering among consultant firm
- 2) To investigate the underlying reasons that discourages the implementation of VE among consulting practice in peninsular Malaysia.

## 1.4 Scope of Study

- The study will focus on literature review and preparing and designing survey questionnaire methods and identify the targeted respondent focusing on consulting practice that involve in infrastructure and building sector in Malaysia.
- Questionnaires of this research will be post to consultant firm in peninsular Malaysia
- Targeted respondent are professional consultants in consultant firm that involve in design phase of a construction project

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

This literature review will be divided into several sections. The first sections will discuss about the background of Value Engineering in term of its origin and its founder. The second section will look into the implementation of Value Engineering in construction industry. Then, the next section focuses on implementation of VE in Malaysia which was conducted by previous researcher. The fourth section which is the scope of this research is about the role of consulting practice and its relation to Value Engineering. The last section will discuss about previous related work that relates to this research.

#### 2.2 Background of Value Engineering

Value Engineering was first developed by Lawrence Miles in 1940s when he works at General Electric Company (GEC). During that time, his company was facing raw material and component shortage due to World War II. Facing wartime shortages, a process for resourcing substitutes was developed by examined what could be used through identifying what was available, which had the unintended consequence of recommending substitutes that reduced costs and improved the product. This method was later developed into a systematic procedure that GEC soon applied to all of its products.

The Navy Bureau of Ships begun to apply this technique in 1954 due to the significant effect on cost reduction and also improvement of the product quality which has been applied successfully in GEC.

In 1956, with the assistance of GEC personnel, The Army Ordnance Corps had started to use the Engineering program. After 10 years of use, the total saving amount is estimated about \$200 million dollar. Then in the year 1962, Secretary of Defense US apply this technique in his Department of Defense to reduce the defense costs. (James J. O'Brien, 1976)

### 2.3 Value Engineering in Construction

The construction industry is an important field for VE at the international level (Kelly, Male et al. 2004) as it is considered critical to the success of projects due to its ability to provide a basis for improving value for money in construction (Ashworth and Hogg 2000). It focuses on value rather than cost and seeks to achieve an optimal balance between time, cost and quality (Kelly, Male et al. 2004) as it provided a method of integration in the building process that no other management structure in construction can provide (Kelly and Male 1991). It also explores the functional requirements and seeks overall optimization accordingly (Shen 1995). VE should precede Cost Management effort (Norton and McElligot 1995) as it has proven to provide significant benefits to clients if it is used correctly (Liu 2003)

Value engineering within construction was pioneered by Mr. Alphonse Dell' Isola in the 1960s. According to him, Value Engineering is a process of relating the functions, the quality, and the costs of the project in the determination of optimum solutions for the project.

He focused on the same goals as Miles and Erlicher in developing a value analysis process for construction. The Federal Government Construction Value Engineering Law (Public Law 104-106) can be credited to Mr. Dell' Isola. During his career, he conducted more than 1,000 VE workshops for various organizations that resulted in savings of \$2.5 billion.

Dell' Isola identifies "improving project value" as the main objective of VE. In addition to improving project value, he states that the project team should utilize VE to overcome poor project value and quality, including:

1. Lack of shared project information - insufficient data on the function of stakeholder requirements. This includes building materials and processes.
2. Lack of ideas, or failure to develop alternate solutions and then making choices based on economics and performance.
3. Temporary circumstances - urgent delivery, design, or schedule circumstances can force decisions that, while quick, are often incomplete without regard to value.

4. Honest but wrong beliefs - decisions based on what is believed to be correct rather than on facts.
5. Habits and attitudes - response to doing the same thing, the same way, under the same circumstances.
6. Changes in stakeholder requirements - new requirements may cause costs to increase without awareness.
7. Lack of communication and coordination - issues of communication and coordination has been determined to be reasons for unnecessary costs.
8. Outdated standards and specifications - VE helps isolate and focus new technologies and standards in areas where high costs with poor value may incur based on wrong or legacy information. Active VE can provide a framework for a rigorous review of project specifications.

The application of VE to a project usually starts with a specific solution to the project that can be called the initial solution. VE also identifies a level of quality for the project, and this initial solution is examined against a background of this level of quality for the project. The examination of the initial solution through the application of the procedures of value engineering leads to a final solution, in which the costs of the initial solution are optimized.

The procedures of VE as stated by Dell'Isola, 1988, are applied in phase by a multidisciplinary study team. The first phase is the information phase, in which all information relevant to the project is obtained, a profile of costs for the project is determined, functions are analyzed, functional relationships are represented in a FAST diagram, and costs of various functions on the FAST diagram are identified

In applying value engineering to a building project, the multidisciplinary team obtains a solution that emphasizes the functions of the project and the best judgment of the team in making final choices, and which results in a cost-effective design for the project. Omigbodun, 2001 conclude that the factors that determine a building project and its costs can be separated into two groups: one consisting of factors related to specific engineering systems and the other of factors that are general in character and relate to the whole building. VE is effective because its procedures give opportunities for raising

design issues associated with the latter group of factors, as well as providing for peer-review of the designs.

## **2.4 Value Engineering in Malaysia**

The implementation of VE in construction project in Malaysia was still minimal compare to other country that already have standards of VE such as Australia, Austria, New Zealand, France, Germany, Hungary, India, Poland, UK and USA. The numbers of projects that have applied VE methodology is only a handful even though mega projects such as Kuala Lumpur International Airport and Telekom Tower has successfully applied its concept.

According to Jaapar and Torrance, 2005 VE was first introduced in Malaysia in 1986. Unfortunately, VE has not yet become widely practiced in Malaysia. It was observed that due to some successful applications of VE in the Malaysian construction industry, further actions should now be taken to exert its full potential to improve value for money for the clients of the industry.

Jaapar and Torrance, 2005 also conclude that VE has been recognized as a factor that is critical to the success of projects, by providing the basis of improving value for money in construction.

This is a strong statement, which if it is well researched, will be able to help the Malaysian construction industry to be more competitive, to provide greater client satisfaction and be able to cushion the impact of globalization in the near future

## 2.5 Roles of Consultants in implementation of Value Engineering

Consultants are individuals who typically work for themselves but may also be associated with a consulting firm. They, for a fee, give advice or provide a service in a field of specialized knowledge or training. According to the directory of Association of Consulting Engineers Malaysia (ACEM, 2002), a Consulting Engineer is defined as a person possessing the necessary qualifications to practice in one or more of the various branches of Engineering who devotes himself to advising the public on engineering matters or to designing and supervising the construction of engineering works and for such purposes occupies and employs either solely or in conjunction with another Consulting Engineer, his own office and staff or, in the case of a partner or consultant of a firm of Consulting Engineers uses the office and staff of the said firm, and is not directly or indirectly concerned or interested in commercial or manufacturing interests such as would tend to influence his exercise of independent professional judgement in the matters upon which he advises.

In Malaysia, the consultants involve in the construction industry such as the Engineers, Architects, and Quantity Surveyors are being guided by their own professional associations. These professionals are required to provide their services in an ethical and professional manner.

The role of consulting engineer usually starts from the beginning of the project stage till the very end of the project. Some of the main services provide by consulting engineers are listed below

- a) Preliminary investigation
- b) Feasibility and cost study benefit
- c) Engineering design
- d) Calling tenders and tenders appraisal
- e) Contract supervision
- f) Contract administration
- g) Project management

The involvement of the consultants and also the clients were very important since they are the key players who play an active involvement in order to produce the specified buildings and other facilities during the construction process. Therefore, their inputs are very important in order to know the level of implementation of VE among them and investigate the underlying reasons that discourage the practice of VE method during the initial design phase of a construction project.

## **2.6 Previous related work**

There are several researchers that have conducted similar research that involve Value Engineering in construction industry in Malaysia. One example of research was done by Aini Jaapar where she has produce several journals about Value Engineering focusing on awareness, perception, satisfaction and other factor related to clients and key player such as contractor and authorities that involve in construction industry in Malaysia

Other researcher that have done similar topic related to Value Engineering is Ng Kim Lai where he produce a thesis entitle "Value Management (VM) in Construction Industry". His research discuss about typical VM job plan methodology, degree of understanding of VM in construction industry and finding the factor that hinder the application of VM and also main factor that encourage implementation of VM.

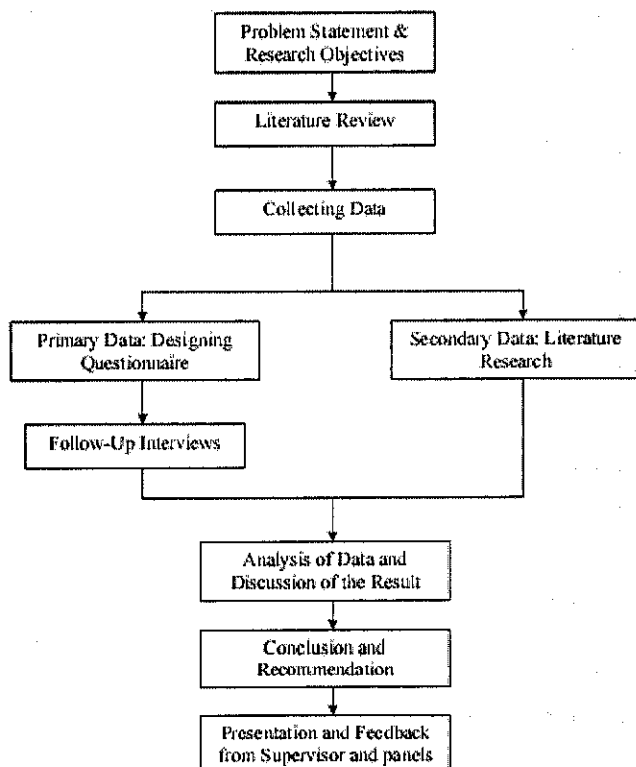
There are no other research papers or journals that conduct studies on implementation of VE which focus on consulting practice in Malaysia. This is a good motivation to do research in this area as consultant and also the clients are the major decision maker for a construction project in order to produce successful project that can be completed within time, cost and resources.



## CHAPTER 3 METHODOLOGY

### 3.1 Survey process

The population sample for this survey is from the consulting firm, contractor and also the client (or the developer) that involve in construction projects in Malaysia. The professional consultants were identified as the architects, the engineers (civil, mechanical and electrical), quantity surveyors, and the project managers. While the client were very important due to their contribution to the development and the growth of construction industry in Malaysia. They were selected to be the respondents due to their important involvement and their impact on the decisions made during the process in a construction project.



*Figure 3.1: Methodology for FYP2*

The sample method used in this survey is the stratified random sampling. With stratified random sampling, the population is first divided into a number of parts or 'strata' according to some characteristic, chosen to be related to the major variables being studied. The advantage of using this method is that it focuses on important subpopulations but ignores irrelevant ones and improve the accuracy of estimation and also very efficient for this survey scope.

The survey method used for this research is by postal survey with survey questionnaires as the tools for survey. This cover letter and survey questionnaires was mailed to the respondent's company and they filled the survey questionnaires and mailed back for further analysis of the results of the survey. The advantages of using the postal surveys are it is cheaper than interviewing and there are no interviewer effects. Postal survey also is the best method for named individual special population samples.

### **3.2 Literature review**

Literature review can provides an overview of VE in construction industry. Although from literature review, there is not much information on the implementation of VE in consulting practice, it can gather the information about the VE job plan methodology to help understand better in constructing questionnaires during survey process. This information can be obtained from article, journals, reference books, conference papers, internet web site and other published research papers. From the literature review, a clearer understanding about this research was established.

Another advantage from the literature review especially from the journals is it helps to understand better about the related topics that have been done by other researcher. By referring to their research, the results of their findings can be used to assist this research to produce better quality of research paper that can benefit other researcher in the same field.

### **3.3 Interviews**

Another method that was used for this research is by conducting face-to-face interviews with the respondents. Although this method have their disadvantages in term of cost and influence of time, the method prove to be useful in gathering the data straight away from the target respondent.

This method also can be flexible as the interviewer is able to explain, probe, check and deal with unforeseen situations with the respondents during the interview session.

The respondents also can give their honest opinion and also their suggestion and recommendations regarding the topic based on their experience. This helps the researcher to produce better understanding on the construction industry practitioner point of view related to the topic.

### **3.4 Tools and Data Analysis**

The tools used for this research are questionnaire for data collection. The questionnaire was designed to collect the information background on level, job title, and organization background of the respondents as well as their years of experience in local construction industry. The survey also asked about related questions on the detail application of VE as well as factors that hinder implementation of VE in construction industry. Suggestion and improvement of VE was also included in the questionnaire for the respondents to give their opinion and ideas based on their experience and knowledge.

Postal survey was chosen as the survey method as it is cheaper and no interviewer effects

The data collected from the questionnaire were analyzed by using statistic tool and Microsoft Excel to interpret the data in graphical form and tables as shown in Figure 3.2

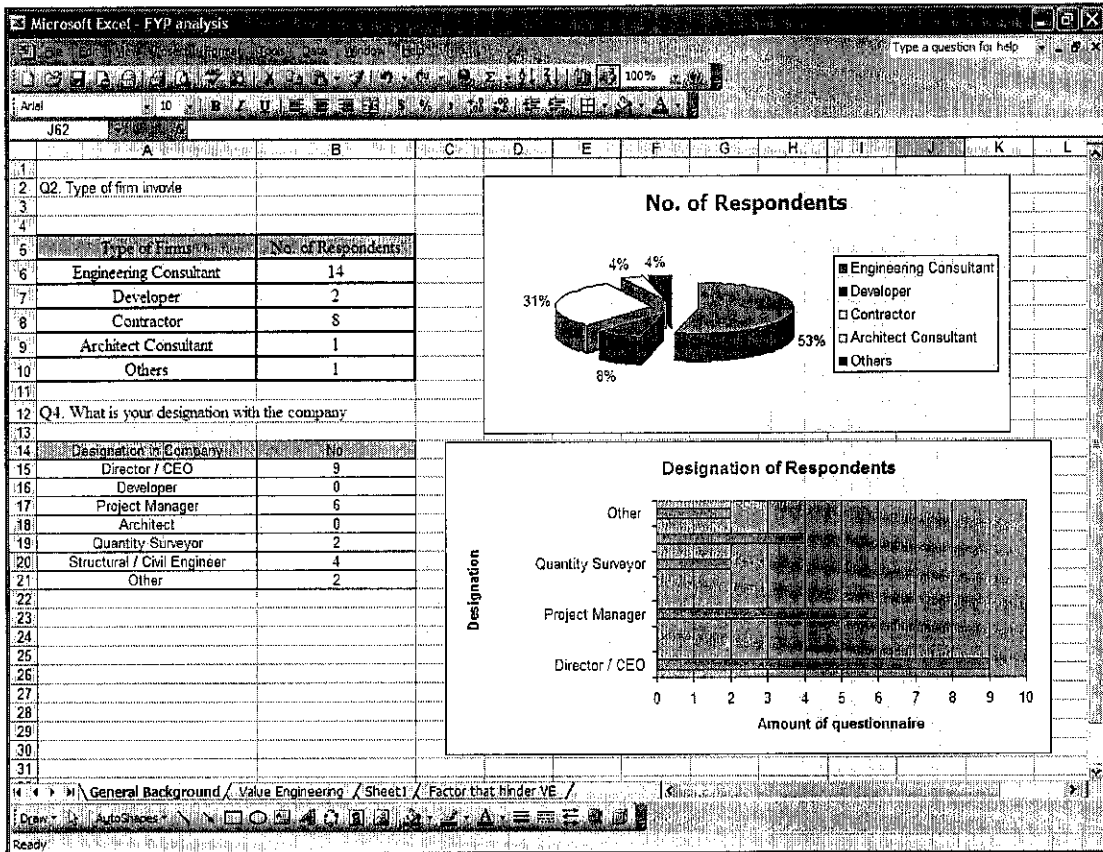


Figure 3.2: The output of the analysis using Microsoft Excel

### 3.5 Average Index (I)

The data that obtain from the questionnaires were analyzed using Average Index (I). Al-Hammad (2000) stated that the formula for Average Index is as follows:  
This index was calculated as follow:

$$I = \frac{\sum_{i=0}^5 a_i x_i}{\sum x_i}$$

Where:

- a<sub>i</sub> = Constant expressing the weight given to i
- x<sub>i</sub> = The variable expressing the frequency of i  
for i = 0, 1, 2, 3, 4 and illustrated as follow

$x_0$ = frequency of 'Strongly agree' response and corresponding to a0	= 5
$x_1$ = frequency of 'Agree' response and corresponding to a0	= 4
$x_2$ = frequency of 'Neutral' response and corresponding to a0	= 3
$x_3$ = frequency of 'Not agree' response and corresponding to a0	= 2
$x_4$ = frequency of 'Strongly not agree' response and corresponding to a0	= 1

Mc Caffer and Zaimi Majid (1977) stated that the classification of the rating scale is like following:

- a) Strongly disagree:  $1.0 \leq \text{Average Index} < 1.5$
- b) Disagree:  $1.5 \leq \text{Average Index} < 2.5$
- c) Neutral:  $2.5 \leq \text{Average Index} < 3.5$
- d) Agree:  $3.5 \leq \text{Average Index} < 4.5$
- e) Strongly agree:  $4.5 \leq \text{Average Index} \leq 5.0$

## CHAPTER 4

### RESULTS AND DISCUSSION

#### 4.1 Introduction

The data for this research were collected through questionnaire. Pilot questionnaire was designed and tested during FYP1 in order to produce questionnaire that will be used for the research. The content and questionnaire layout were corrected and improved based on the feedback from the pilot questionnaire.

The content of the questionnaire is focused on respondent's background and company background and their experience in construction industry. Related question about VE were also included in the questionnaire especially application of VE and factors that hinders implementation of VE in Malaysia. All this data were stored and analyzed by using Microsoft Excel.

The results of the analysis were presented by using pie chart, bar chart or descriptive statistic like average index. The main purpose of using Microsoft Excel to analyze the data is to create a result that can achieve the objective of the research which is:

- To identify the degree of understanding of value engineering among consultant firm
- To investigate the underlying reasons that discourages the implementation of VE among consulting practice in peninsular Malaysia.

#### 4.2 Pilot Survey Questionnaire

A pilot questionnaire was designed after collecting and understanding the information regarding the project topic from the literature review and further reading from books and other sources such as from the internet. This is to ensure the information related to implementation of value engineering within consulting practice in Malaysia could be collected and further analyzed by providing related questions in the pilot questionnaire.

Respondents from different background have been chosen to test the pilot questionnaire by commenting on the content of the pilot questionnaire and to gather their

recommendation and suggestion in order to improve the question wording and the layout of the questionnaire. The respondents consisted from the academic personnel with civil engineering background and registered contractors from the construction industry.

A total of six (6) pilot survey questionnaires were distributed to the selected respondents. The selected respondents consists of three (3) lecturers from Civil Engineering department that represent the academic personnel and three (3) respondents from registered contractor's company from the construction industry in Malaysia. Due to unforeseen problem, one of the respondents fails to submit the survey questionnaires in the given dateline.

#### 4.2.1 Findings on Pilot Survey Questionnaire

#### 4.2.2 Mistakes in the content of the survey questionnaire

- i) Mistakes in Introduction part in the questionnaire
  - In the introduction part, the definition of Value Engineering need to be define clearly to help the respondents understand better.
  - The objective of the survey should also be included in the introduction part to get better answers from the respondents about what the aim of the survey research.
  - Some error in grammar in the sentence
    - "...strategic approach *to* achieving maximum..." should be replace by "...strategic approach *for* achieving maximum..."
    - "...which are *section* A, B, C, and D." should be replace by "...which are *sections* A, B, C, and D."
- ii) Mistakes in Section A
  - In Part II, the title "Respondents" should be replaced by "Respondent"
  - In Part I Question 3 and Part II Question 2, the sentence "construction" to be specific as there are many type of construction in construction industry.

iii) Mistakes in Section B

- In Question 1, one of the respondents suggested the addition of “Other industrial practitioners” in the answer set. Also some error in capital letters in one of the answer set.
- One of the respondents also is not clear in Question 2 and need to be constructed again with question that is direct and easy to understand.
- In Question 3, “How many *times*...” should be replaced by “How many *project*...” and removing the sentence “...in your project.” Also additional “No” answer in the answer set.
- In Question 5, additional sentence starting with “What kind of...” in the question and removing “s” in the word “projects”. Also replacing “...involve in...” with “...use...” and removing word “Sessions” in the questions.
- In Question 6, the whole sentence is suggested to replace by “How frequent Value Engineering is apply in each a stage of a project?”
- In Question 7, additional of “(0) in the “[ ] No saving 0%” in the answer set.

iv) Mistakes in Section C

- In Question 12, addition of word “other” between the sentence “Any comments.....”

v) Mistakes in Section D

- Removing the sentence “.....by ticking the appropriate box below:” in Section 1.
- Removing the sentence “...the copy of...” in Section 1 answer set
- Removing word “mobile number” and replacing “at” to “to” in Section 2.



### **4.2.3 Interview session with the respondents**

When conducting the pilot survey questionnaire session with the respondents, the author manages to do face-to-face interview with two of the respondents from the contractor's company. They are Ahmad Rashidi Md Yusof from Agro Mahligai Sdn Bhd which located at Bandar Seri Iskandar, Tronoh and Raja Shaharul Ahmad Reza B. Raja Abd. Aziz from Ekram Builders Sdn Bhd which located at Ipoh, Perak.

During the interview, the respondents gave some opinion related to the topic discussed in the survey questionnaire base from their experience in the construction industry. They also give full support by trying to answer some of the questions base on their own knowledge about the topic.

### **4.2.4 Discussion**

### **4.2.5 Understanding about the content**

During the Pilot Survey session with the respondents, a brief explanation about the topic and the objective of the questionnaire was given to them. This is to ensure that they understand the whole idea of the questionnaire.

The respondents that represent the academic personal did not have any problem about the topic. They have done some correction on the questions and some adjustment on the sentence of the questions. Their input was helpful enough in order to create better understandable questions.

While the respondents from the construction industry were also did not have any problem in understanding the contents of the questionnaire. They give good impressions as the questionnaire was not too lengthy and didn't take long time to answer all of the questions. They also try some of the questions and give some suggestions to improve the wording of the questions in order for others respondents to understand the questions better.

#### 4.2.6 Understanding about the topic of the research

During the Pilot Survey session, some of the respondents did not know about Value Engineering. With a brief explanation in the questionnaire about VE, they have some impression about VE and help them to go through all of the questions in the questionnaire.

#### 4.3 Questionnaire Collected

There were two hundred and fifty (250) set of questionnaires that have been posted to different respondents with different background in construction industry in order to achieve the objective of the research. However, only twenty three (23) respondents replied the questionnaire. Therefore only twenty three (23) set of questionnaire data were collected. Although it was below expectation from the required target, a general picture of the present status of VE in construction industry can still be formed based on the scope target

#### 4.4 General/ Background Information

##### 4.4.1 Company's Location:

*Table 4.1: The amount of questionnaire received from different location*

Company's Location	No. of Respondents
Perak	9
Selangor	8
Kedah	1
Negeri Sembilan	1
Pulau Pinang	1
Johor	1
Terengganu	1
Sarawak	1
Total	23

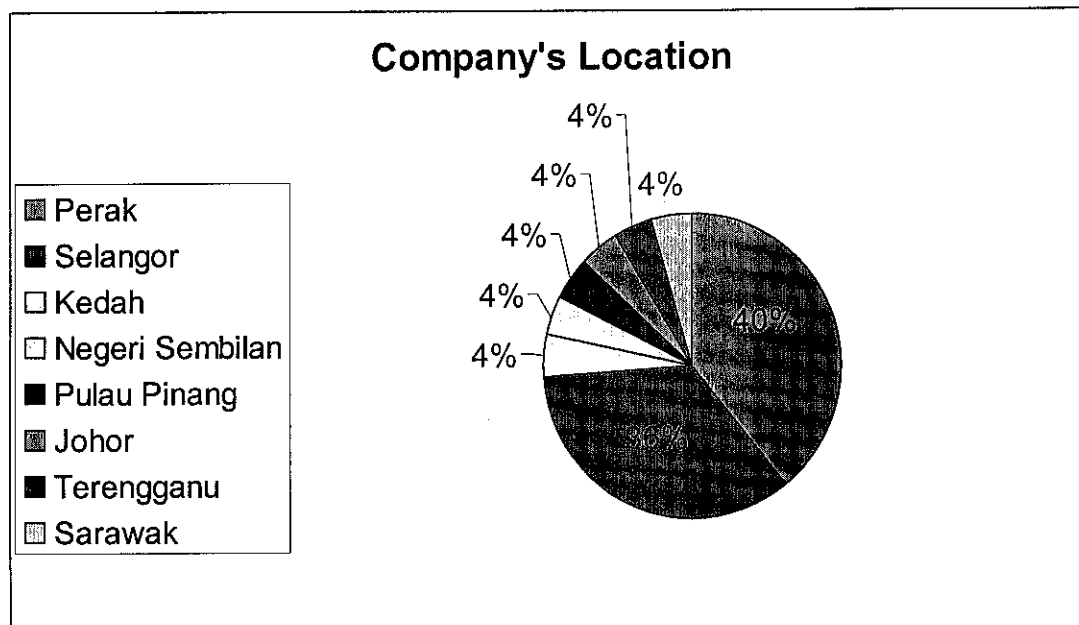


Figure 4.1: The amount of questionnaire received from different location

Table 4.1 and Figure 5.1 show the location of company that participate and reply the questionnaire. The result show that majority of respondents are from Selangor and Perak. It is known that these two states in Malaysia have numerous consulting engineering company and contractor that involve in construction industry. However this statistic cannot be taken as a conclusion as the respondents that reply to the questionnaire is slightly small.

#### 4.4.2 Type of Firm Involved

Table 4.2: The questionnaire distribution to construction's companies

Type of Firms	Amount of questionnaire received	Amount of questionnaire sent	Percentage received (%)
Engineering Consultant	13	50	26
Developer	2	50	4
Contractor	6	50	12
Architect Consultant	1	50	2
Others	1	50	2
<b>Total</b>	<b>23</b>	<b>250</b>	<b>9.2</b>

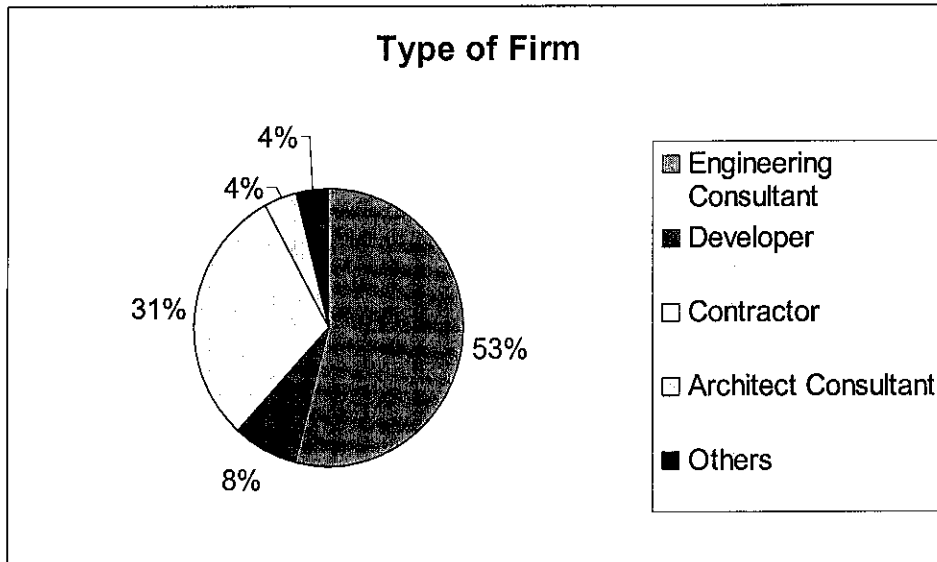


Figure 4.2: The amount of questionnaire received from different firm

The respondents that contribute to this questionnaire are mainly from Engineering Consultant firm which is 53% from overall respondent followed by Contractor Company which contributes about 31%. From the percentage result, the scope of this survey research has been fulfilled where the main goal for this research is to get feedback from Engineering Consultant firm in Malaysia as much as possible.

Table 4.3: Designation in the company

Designation in Company	No.
Director / CEO	9
Developer	0
Project Manager	6
Architect	0
Quantity Surveyor	2
Structural / Civil Engineer	4
Other	2
Total	23

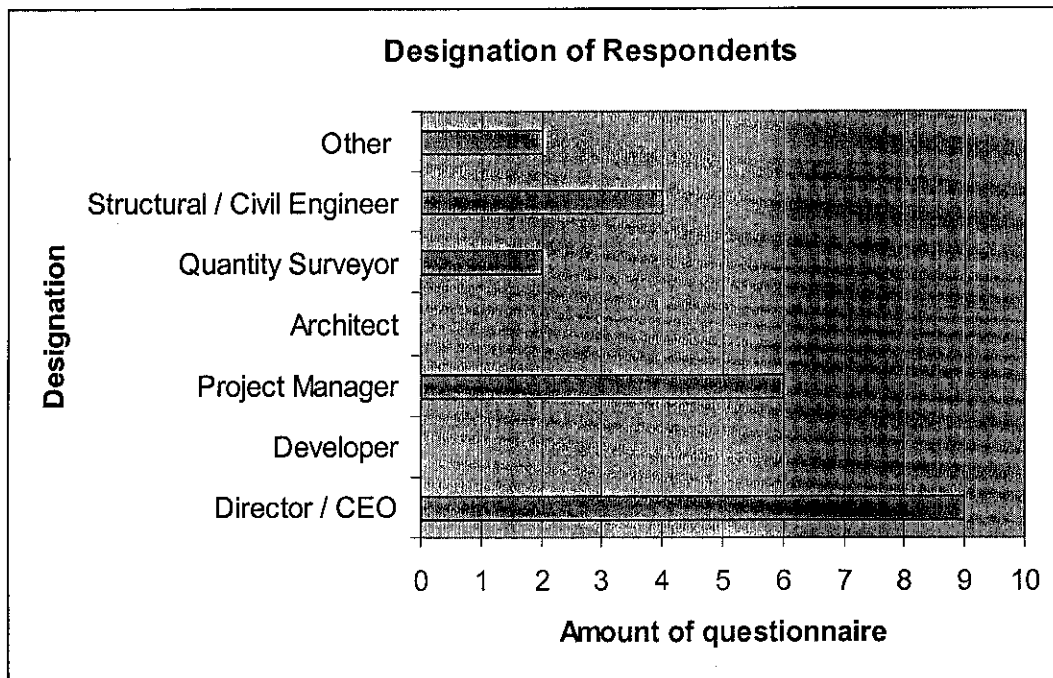


Figure 4.3: Designation of respondents

From Table 4.2, it is found that most of the respondent's that answer the survey questionnaire mostly from Director/CEO of the company which is a good indication of their interest in this survey research. They also have a strong background experience in construction industry as most of them have about 15 years and more in this area. With their strong background in knowledge and experience, their opinion in this research survey is essential to reach the objective of the research.

#### 4.5 Value Engineering

##### 4.5.1 Value Engineering Awareness

Table 4.4: VE Awareness

VE awareness	No.	%
Yes	17	74
No	6	26

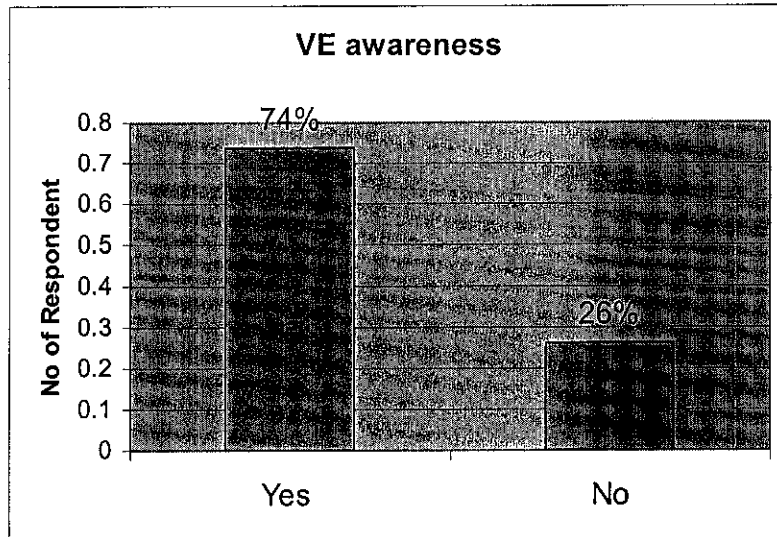


Figure 4.4: VE awareness

Table 4.5: VE information source

Learn or heard about VE	No.
Professional Seminar	4
Publication, Journal, articles	6
Colleague and Friends	4
Already applied	7
Other	0
<b>Total</b>	<b>21</b>

From the Figure 4.3 and Table 4.4, the results show that 74% of the respondents are aware of Value Engineering. These results indicate early perception of the respondent's level of understanding about VE. From Table 4.5, the respondent's awareness of VE is from their company where VE is already applied. Their awareness about VE also comes from publication, journal and articles. These results show that information about VE has reached into the community from the construction industry. It is suggested that the concept or the methodology of VE should also be explained to these people in order for them to fully understand about the concept of VE.

#### 4.5.2 Implementation of VE

Table 4.6: Implementation of VE

Implement VE	No	%
Yes	12	71%
No	5	29%

From the seventeen (17) respondent that aware about VE, twelve (12) of them has implemented VE in their project while five (5) or 29% of them have not applied VE in their previous project. The total projects that they have implemented VE is related to Table 4.7

Table 4.7: Project Implementation of VE

Project Implementation of VE	No
1 to 5	5
5 to 10	3
10 to 15	2
above 15	2
Total	12

The total project that the respondents have implemented VE is shown in Table 4.7 where a total of five (5) respondents have implement at range of 1 to 5 projects. It is found that there are still not many projects have implemented VE where from the table, only two (2) respondents claimed that they have implemented VE in more than 15 projects.

The projects that usually use VE range from High Rise Building project and Residential Houses/Shop project as this two kind of project is most awarded to contractors and consulting firms and the demand for these kind of projects is also very high compared to Hydrology/Irrigation System, Public Transportation, or factory/ plant project

*Table 4.8: Application of VE in stages of construction project*

Construction project stages that most frequently use VE	Least Frequent	Less Frequent	Average	Frequent	Most Frequent	Average Index	Result
Concept/Feasibility Stage	2	3	3	1	3	3.0	Average
Preliminary Drawing	1	3	4	3	1	3.0	Average
Detail Drawing	1	1	2	5	3	2.3	Less Frequent
Procurement	2	1	5	3	1	3.0	Average
Construction Stage	1	0	3	3	4	2.2	Less Frequent

(1)- Least Frequent (2)- Less Frequent (3)- Average (4)- Frequent (5)- Most frequent

From Table 4.8 show the result of the application of VE in stages of construction project. The respondents need to rate the answer according to the given stages from Least Frequent to Most Frequent. The answer that they give has marks range from one (1) mark for Least Frequent until (5) mark for Most Frequent. From the table, Concept/Feasibility Stage and Procurement is where VE is frequently applied.

From the table, all the stages during construction project were average and less frequent in application of VE. However, base on the ranking, the most frequently used of VE in construction project is during Concept/Feasibility Stage. This is followed by Procurement stage in second ranking. The least frequent used of VE during construction project is during construction stage as it was in last position of the ranking. It is concluded from the Table 4.8 that Concept/Feasibility Stage and Procurement is where VE is frequently applied.



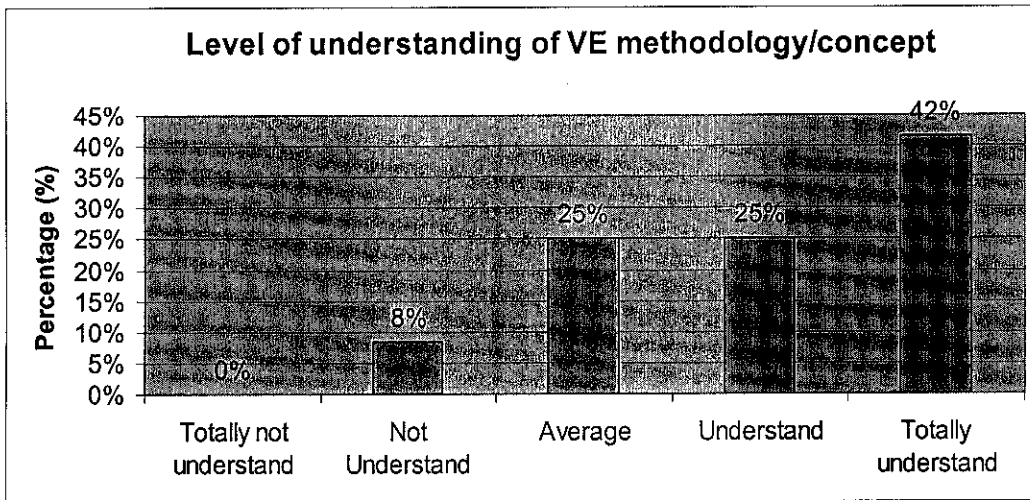


Figure 4.5: Level of understanding of VE

From Figure 4.4, 67% of the respondents understand the VE methodology or concept with 42% of them totally understands about the methodology. This is a positive outcome from the industry that they are ready to implement VE in future project.

By understanding the concept or methodology of VE, the company in Malaysia has gained a useful knowledge and can compete with global market and explore opportunities in oversea. They also can offer consultation and service to foreign company and further promote this concept.

Table 4.9: Implementation of VE in future project

Implement VE in future project	No.	%
Yes	18	78%
No	5	22%
Total	23	100%

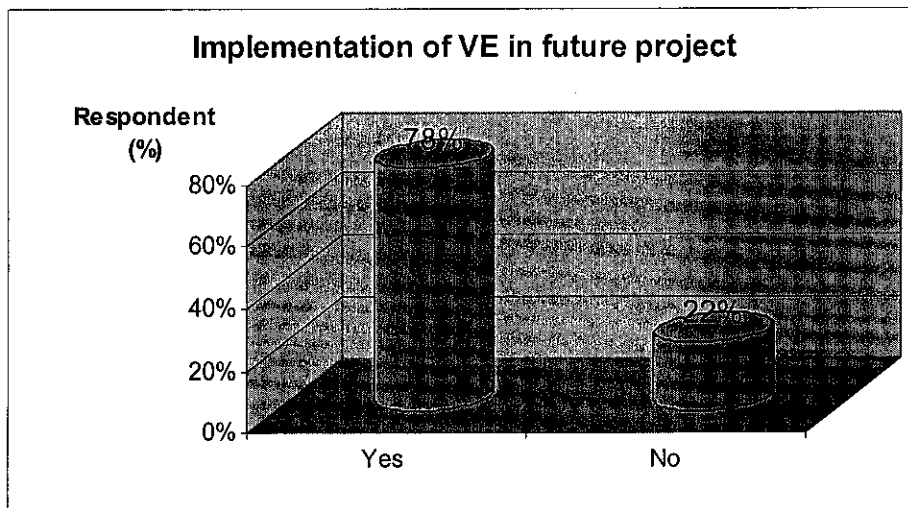


Figure 4.6: Implementation of VE in future project

For Table 4.9 and Figure 4.5, the results show positive outcome that 78% of the respondent is ready to implement VE in their future project while the other 22 % of the respondents did not interested to implement VE in their future projects. With the aid from the government and professional bodies, the increase in implementation of VE can be fulfill as shown in the interest of respondents to apply VE in their future project.

#### 4.5.3 Factors that hinders the implementation of VE

The factors that hinder the implementation of VE are shown in Table 4.10. Base on the comments from (23) twenty-three respondents, who was aware about Value Engineering.

The average indexes of all factors are in range of 3 to 4 which conclude that the respondents were agreed or neutral to all the factors listed down in the questionnaire. They were agree that lack of local guideline and info about VE, lack of knowledge and practice in VE, interruption to normal work schedule, and conflicting of objective by different parties are the factors that hinders the implementation of VE while the other two reasons, they were neutral about this matter.

Table 4.10: Factors that hinders the implementation of VE

Factors that hinder implementation of VE	Strongly Agree	Agree	Neutral	Not Agree	Strongly Not Agree	Average Index	Result
Lack of local guideline and info about VE	5	13	3	2	0	3.9	Agree
Lack of knowledge and practice in VE	4	15	2	2	0	3.9	Agree
Interruption to normal work schedule	5	7	8	1	2	3.5	Agree
Too expensive to carry out VE	3	6	8	4	1	3.3	Neutral
Conflicting of objective by different parties	5	9	5	4	0	3.7	Agree
Not suitable for low-cost project	2	9	4	6	2	3.1	Neutral

From the results, the main factors that hinder the implementation of VE are lack of local guideline and info about VE in Malaysia. This might be due to the procedures and application of Value Engineering in Malaysia is still follows other country's manual, and there is no Malaysia's Value Engineering standard created so far until now.

## CHAPTER 5

### CONCLUSION

#### 5.1 Introduction

The first and second objective was achieved through analysis of the data from survey questionnaire in Chapter 4. The conclusions of this research were summarized as follow:

##### 5.1.1 The Degree of Understanding of VE among consulting firms in Malaysia

The respondent's degree of understanding about VE was above expectation. This represent by the level of awareness, number of project that have implemented VE, and also the understanding of VE methodology which generally exceed 50% of positive results. The results were also encouraging towards future in Value Engineering in Malaysia construction industry when more than 70% of the respondents stated that they were interested to integrate VE implementation in their future projects. The main contributor for the data was also mainly from Consulting firm and also contractor companies where they were inter-related in a construction project. Although the result does not represent overall population of consulting firm in Malaysia due to small number of respondent, from the data collected, it can be concluded that the first objective of this research has been achieved

##### 5.1.2 Factors that hinders the implementation of VE

There are 4 main factors that were agreed by the respondent that hinders the implementation of VE that needs to be taken care of. They are:

- Lack of local guideline an info about VE
- Lack of knowledge and practice in VE
- Conflicting of objective by different parties
- Interruption to normal work schedule

These factors should be taken into consideration and solutions or alternatives should be implemented to tackle the problem.

## 5.2 Recommendation

Below are some recommendation to improve the awareness and usage of Value Engineering in construction industry:

- Related organizations and professional bodies like IEM (Institute of Engineers Malaysia) and CIDB (Construction Industry Development Board Malaysia) can organize more seminars or training program to introduce about Value Engineering concepts and methodology in construction industry.
- The government needs to encourage and promote the use of Value Engineering in construction industry, since the majority of the private sector may not be willing to take the first step to implement it.
- Top management in any organizations that involve in construction industry need to be exposed, supportive and apply Value Engineering in their organization to promote Value Engineering to their employee or engineers
- Establish a local Value Engineering implementation guideline, which represent local scenario in construction industry and not fully following the American Standard.

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## **APPENDICES**



## PLANNING SCHEDULE AND OVERALL WORKDONE

Planning Schedule for FYP-1

Activities	Study Week & Exam Week																	Semester break						
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	
Research objective & problem statement																								
Literature Review																								
Designing Pilot Questionnaire																								
Test Pilot Questionnaire																								
Analysis Data and Discussion of result																								
Presentation & Feedback																								
Distribute final draft of survey questionnaire to respondents																								

Planning Schedule for FYP-2

Activities	Study Week & Exam Week													Semester break										
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	
Literature Review																								
Collecting data from final draft of survey questionnaire																								
Analysis Data and Discussion of result																								
Conclusion and recommendation																								
Presentation & Feedback																								

Planned Activity

Completed Activity

Incomplete Activity



UNIVERSITI  
TEKNOLOGI  
PETRONAS

23<sup>rd</sup> January 2008

Dear Sir/Madam,

**Implementation of Value Engineering Within Consulting Practice In Malaysia**

We seek your help in a university research survey on the implementation of Value Engineering within consulting practice in Malaysia especially in peninsular of Malaysia.

Value Engineering (VE) has been widely accepted internationally especially in the USA, Japan, European countries, and other developing countries such as Australia. In Malaysia, the level of implementation of VE is still low and not so popular especially during design phase of a construction project.

Value Engineering is a well-established methodology for defining and maximizing value for money. It can be applied to any type of project regardless of size or timeframe and at all stages throughout the life cycle of the project from inception to completion. Therefore the main objective of this survey is to identify the degree of understanding of VE among consultant firm and investigate the underlying reason that hinders the implementation of VE especially consulting practice in peninsular Malaysia.

We have devised a questionnaire which we would like you to complete and return and which will only take no more than 15 minutes of your time. With your cooperation, we should be able to collect as many data as possible regarding the implementation of Value Engineering within consulting practice in Malaysia.

It would help us very much if you could complete and return the questionnaire before **20<sup>th</sup> February 2008**. As an enclosure to this letter, please find a self-addresses and stamp envelope to return the questionnaire.

If you need further information, please contact Mohd Syahrin at **017-7188980** or email to **mohd\_syahrin@utp.edu.my**

We thank you in advanced for your support and co-operation.

Yours sincerely,

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Head of Civil Engineering Department,  
Universiti Teknologi PETRONAS

Cc: Assoc. Prof. Ir. Dr. Arazi Idrus  
Mr. Mohd Syahrin b Ab Rahim

# IMPLEMENTATION OF VALUE ENGINEERING WITHIN CONSULTING

## PRACTICE IN MALAYSIA

Value Engineering (VE) is a well-established methodology for defining and maximizing value for money. It can be applied to any type of project regardless of size or timeframe and at all stages throughout the life cycle of the project from inception to completion. However, the implementation of VE is still low and not so popular especially during the design stage of a construction project. Therefore the main objective of this research is to identify the degree of understanding of VE among consultant firm and investigate the underlying reason that hinders the implementation of VE especially consulting practice in peninsular Malaysia.

This questionnaire is divided into **three** sections which are **section A, B, and C**. Please answer the questionnaire by referring to the instructions given in each section.

### Section A: General / Background information

Please fill in the blanks or tick in the [ ] provided.

#### **I. Company:**

1. Name of Company: \_\_\_\_\_
2. State the type of firm involved  
 Government Sector     Developer                       Contractor  
 Engineering Consultant    Architect Consultant  
 Other, please state \_\_\_\_\_
3. Company's experience in building construction? (Years)  
 <5     5-10     10-20     >20

#### **II. Respondents**

4. What is your designation with the company?  
 Director/CEO     Developer                       Project Manager  
 Architect                       Quantity Surveyor    Structural/Civil Engineer  
 Other, please state \_\_\_\_\_
5. Respondent's experience in construction industry? \_\_\_\_\_ years

### Section B: Value Engineering

Please fill in the blank or tick in the [ ] provided

6. Are you **aware** about Value Engineering?  
 Yes     No  
*(Go to **Question 14** if your Answer is No)*
7. Where did you heard or learn about Value Engineering?  
 Professional seminars     Professional publications, journals, articles  
 Colleagues and Friends     Already applied in my organization  
 Other, please state \_\_\_\_\_

8. Have you implement Value Engineering in your project?

Yes       No

(Go to **Question 15** if your answer is No)

9. How many **projects** have you implement Value Engineering?

1-5       5-10       10-15       >15

10. What kinds of project **mostly use** Value Engineering?

Hydrology/Irrigation System     High Rise Building     Public Transport

Residential Houses/Shop       Factory/Plant

Other, please state \_\_\_\_\_

11. Which stage of the construction project is most frequent in applying Value Engineering? (Please rate the answer according to your understanding)

**1- Least frequent, 2- Less frequent, 3- Average, 4- Frequent, 5- Most frequent**

①    ②    ③    ④    ⑤

Concept / Feasibility Stage     

Preliminary Drawing             

Detail Drawing                     

Procurement                       

Construction stage                

12. Please state the percentage of cost savings of the project after applying Value Engineering

No saving (0%)     0 – 25 %     25 – 50%     > 50%

13. What is your level of satisfaction after implementing Value Engineering in your project? Please state your reason

Extremely Satisfied       Very Satisfied       Average

Not Satisfied               Extremely Not Satisfied

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14. Do you fully understand the methodology/concept of Value Engineering?

Totally not understand     Not Understand       Average

Understand                   Totally Understand

15. Do you want to fully implement Value Engineering in the future project?  
(Please state your reason if your answer is No)

Yes

No

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16. In your opinion, what are the factors that hinders the implementation of Value Engineering in Malaysia?(Please rate the answer according to your understanding)

1- Strongly Agree, 2-Agree, 3- Neutral, 4- Not Agree, 5- Strongly Not Agree

①   ②   ③   ④   ⑤

Lack of local guideline and information about VE  

Lack of knowledge and practice in VE  

Interruption to normal work schedule  

Too expensive to carry out VE sessions  

Conflicting of objective by different parties  

Not suitable for low-cost project  

(Project less than RM 10 million)

Other factors

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17. Please write down any suggestion or recommendation for increasing the awareness and acceptance of Value Engineering in construction industry

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### **Section C: Feedback**

1) Please indicate whether you wish to receive a copy of the result of this study

Please send me a copy of the result

Please do not send me the copy of the result.

2) If you need further information, please contact Mohd Syahrin at **017-7188980** or email to **mohd\_syahrin@utp.edu.my**

**Thank you for your time and cooperation in completing the questionnaire.**