THE INTRODUCTION OF VALUE ENGINEERING IN JAPANESE CIVIL ENGINEERING INDUSTRY

Edward Badu, Student Member, Nagoya Institute of Technology
Kaoru Wada, Regular Member, Nagoya Institute of Technology
Koshi Yamamoto, Regular Member, Nagoya Institute of Technology

1. INTRODUCTION

The number of Japanese civil engineering projects has increased remarkably since mid-1960s. This growth and the increasing project costs have brought an interest and the need to find means of reducing cost, while maintaining functional requirements and quality. In this paper, conditions favoring the application of value engineering concept in the Japanese civil engineering industry were identified and means of integrating the concept in the present contractual arrangement in the Japanese system were suggested.

2. THE CONCEPT OF VALUE ENGINEERING

Value engineering or value analysis is a systematic approach to obtain optimum value of a product, system or service, by ensuring that the necessary function or functions are provided at a lower cost. It involves the identification and elimination of unnecessary costs which provide neither use, nor life, nor aesthetic, nor customer or client's features. The philosophy is based on the use of different sets of techniques carried out within a job plan. Figure 1 shows a value engineering job plan.

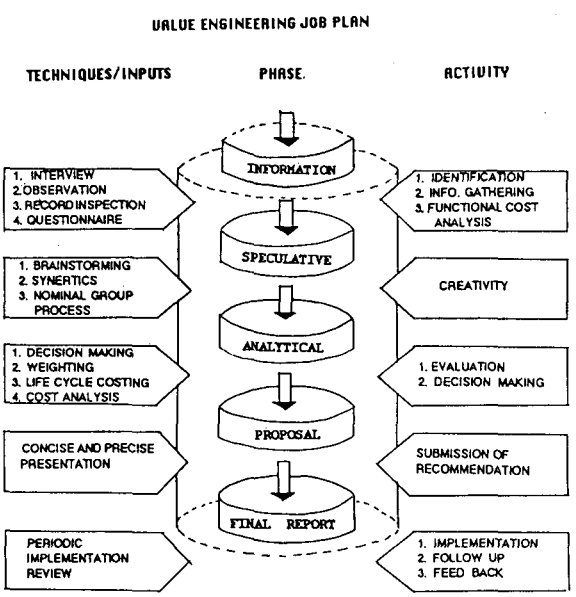

Fig. 1 Value engineering job plan

CITY OF NEW YORK

OFFICE OF MANAGEMENT AND BUDGET

Value Management capital savings through first quarter of 1987.

PROJECT	COST ($)	SAVINGS ($)	COST OF STUDIES ($)
1) White Street Jail	82,600,000	21,644,000	170,000
2) East Facility Jail	94,100,000	9,124,000	101,000
3) Policy Plaza Reconstruction	7,700,000	4,781,000	42,000
4) Fresh Fields Barge Unloader and Landfill Developments	250,000,000	38,366,000	139,000
5) Central Park Precinct Reconstruction	4,800,000	659,000	24,000
6) Astoria Pool Construction	21,700,000	4,430,000	64,000
7) La Guardia Community College Expansion	89,100,000	2,750,000	78,000
8) Elmhurst Hospital Expansion	185,700,000	23,705,000	70,000
9) 41st Police Pct., Bronx New Facility	9,200,000	1,189,000	14,000
10) Rescue 1 Firehouse New Facility	2,800,000	112,000	14,000
11) Aquarium - Sea Crofts Expansion (New Exhibits)	17,600,000	1,928,000	50,000
12) Prospect Park Zoo Reconstruction	28,300,000	2,900,000	70,000
13) Mini School Prototype	1,700,000	148,000	35,000
14) Carpenter Avenue Area Street, Reconstruction, Bronx	19,000,000	2,400,000	60,000
FINALISED TOTAL	814,300,000	114,136,000	922,000

Table 1: Source: The Cost Engineer, Vol.27, No.3, 1989.

Fig. 2 Value engineering cost savings

Some of the advantages derived from the application of the concept of value engineering are lower cost and more functional projects, improved designs and fast completion time. Significant cost savings have been achieved by applying value engineering to designs

or products without affecting quality and function. Figure 2 shows cost savings to some projects in the U.S.A. by implementation of value engineering studies.

3. CONDITIONS FAVORING THE APPLICATION OF VALUE ENGINEERING TO CIVIL ENGINEERING PROJECTS IN JAPAN

1) Client

The Ministry of Construction, which has the biggest administration machine in Japan, is the main controlling body of most public civil engineering projects in Japan. The Ministry will welcome an application of any technique which is geared towards reducing cost while ensuring functional performance and quality requirements. In addition, with one major client, there would be less divided attention in instituting value engineering studies as a pre-requisite for tender and award of contract.

2) Tender and contract formation

Attempts at implementing value engineering must first recognize the system to which it is to be applied. Design and build system is mostly used in Japanese public works. This involves early contractors' involvement in the design. Design development stage is a very ideal stage for undertaking value engineering studies. At this stage, construction methods, planning, design and cost may be considered together during the study.

3) Japanese management style

The success of value engineering exercise depends primarily on team effort. It requires members of the value engineering team to work in peace and harmony and with a deep concentration on the subject of the study. The group decision approach in decision making, discipline and remarkable concentration of effort in the Japanese management system will facilitate value engineering application.

4) Total quality management

The Japanese civil engineering industry has some features which make quality prominent and therefore value engineering a welcome approach. These include high investment on research and development, classification of contractors annually based on performance, cordial relationship within the industry and the fairness and flexible nature of Japanese contracts.

4. CONCLUSION

From the authors' viewpoint, the chances are high that the rather marginal costs involved in conducting a value engineering study can return a savings by a significant amount in civil engineering projects in Japan. Conditions are favorable in the civil engineering industry to ensure its complete acceptance and enforcement as a cost effective technique. Value engineering is therefore recommended in the following areas:

(1) Contractors should be encouraged to conduct value engineering exercises in arriving at their designs and initial estimates.

(2) During construction, Value Engineering Change Proposal (VECP) should be instituted. Under VECP, costs savings derived from value engineering studies should be shared at an agreed percentage by the client and the contractor to serve as an incentive.

(3) The Ministry must offer support for the study. This should include offering financial support, basic information on past projects and technical men to assist the contractors' value engineering team.

(4) It may also be worthwhile considering the creation of some kind of value engineering management committee by the Ministry to ensure the implementation and education of contractors on value engineering on public works projects.