

## **Paper Title**

### **Improvement of Value Methodology Process to Make a Public Enterprise Effectively & Efficiently**

## **Author Name**

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Dr. Young-Joo Suh (Ph.D., CVS-life) has just worked as the president of SKVM from 2016 to 2018. He was also the president of Society of Korean Value Engineers (SKVE) from 2009 to 2013, spreading widely Value Methodology in a number of Korean manufactural and construction private and public firms. He also has played a role as the chairman of the Certificate Board of SKVE from 2014. On the other hand, as a CEO and representative consultant, he has worked for VC Consulting Inc., dealing with about 250 VE related projects for 30 years. During the period of 1980, he introduced VE (Value Engineering) to Samsung Electronics Ltd., the first Korean company applying VE, establishing a competitiveness in product development and cost reduction. As the CVS Module-I instructor, he has produced 110 groups for about 10 years.

## **Abstract**

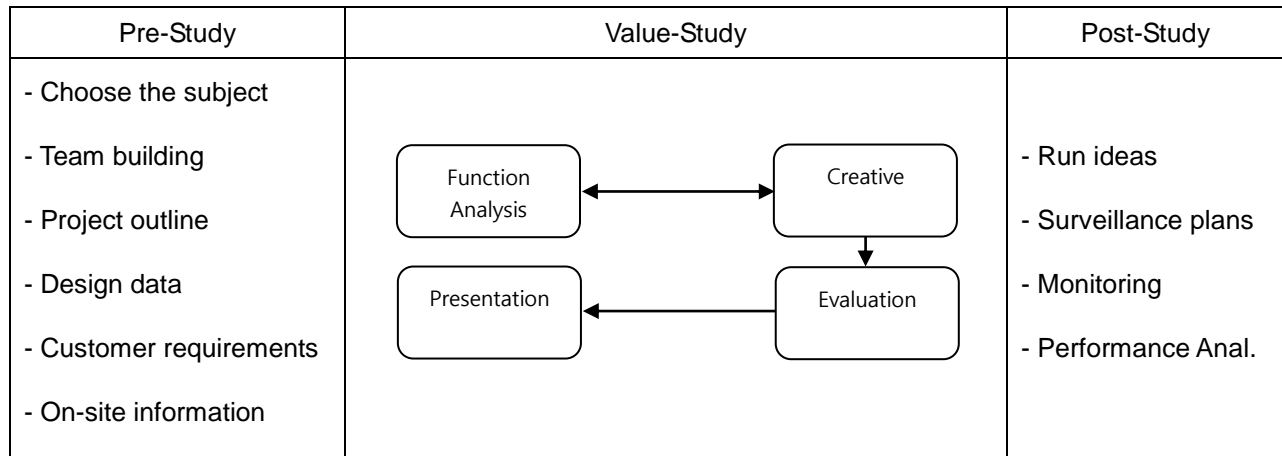
One of Korean public enterprises asked for develop the VM process for their energy plant construction business. Through researching internal and external data and information of the organization, we found out the present VM process's problems and improved the process, studying the trend of its market and technology and benchmarking 5 other organizations' VM process.

Furthermore, we provided the process innovation methodology to improve the value of operation of energy plant. The process will lead the three main advantages in client's O&M business, reducing the effect from drawbacks of operating energy plant.

## The background and drawbacks of VM process of energy plant construction business at the public enterprise

Based on the Article 75 of the Enforcement Decree of the Construction Technology Promotion Act (economic feasibility study of design), a public enterprise, belong to the energy sector, has been carrying out the Value Engineering (VE) process from 2009 on construction and civil engineering. However, the VE/VM process of the company has two main shortcomings.

First, the missing of information phase at the value-study. In the VM project, only limited ideas are derived from the absence of the Information phase, and naturally, at the Function Analysis phase, there arises a problem of making use of the limited ideas in accordance with the required format.



**Figure.1 VM Process of the company**

Second, the same subject of VM study at the Design VM and Construction VM step. Since the object to be studied in the design stage and construction stage is the same as the design specification, its effectiveness is lowered in the construction VM step.

## The study of internal and external data and process

To develop the process, it is required that review the internal and external data and process first.

As the internal data, we reviewed the yearly VM project result reports, the idea creation process and implementation methods for effective operation of the power plant, and the mid- to long-term business plan of the head office and the business center, and reflected the part that can be utilized in VM process.

As the external information, we compared VM processes coming from five representative organizations using Value Methodology. The characteristics of five institutions are listed below.

- 1) Korea Environment Corporation: Performance Model Analysis for maintenance of long-term quality of environmental facility in the Function Analysis phase
- 2) Ministry of Land, Infrastructure, and Transport in Korea: Duplicate Problems of Design VM and Construction VM are same as those of our client's
- 3) Samsung Electronics: Target costing for the product, commercialization and patent review, competitor benchmarking, giving a motivation by operating the incentive system
- 4) POSCO: Maximizing the efficiency of the amount and quality of ideas through drawing out improvement points in the Information and Function Analysis phases, utilizing process-oriented

target costing method and applying the incentive schemes

- 5) SAVE International: Information-Function Analysis-Creative-Evaluation-Development-Presentation, Well-made 6 phases in the Value-Study, very helpful process for construction sector

### **The developed VM process for the energy plant construction business of the company – focusing on the changes**

- 1) Pre-Study
  - a) Applying 'Kick-Off', which was not used for the VM projects' low importance at the energy sector in Korea
  - b) Adding external VM specialist, technical experts and project partners to the CFT
  - c) Set-up the Personnel Evaluation Criteria and Incentive schemes for VM CFT members
- 2) Information – newly added
  - a) New technology / Construction method / Material and patent investigation
  - b) Power Plant Specialization through Value Curve Analysis
  - c) Review Smart Factory technology application
  - d) Utilizing Global Technology & Economy Survey Data on New & Renewable Energy
- 3) Function Analysis
  - a) Perform thorough Function Analysis phase based on information collection
  - b) ①unnecessary, ②excessive, ③insufficient, ④creation, ⑤combination, ⑥alternative Function Analysis
  - c) Increase the number of ideas and shorten the time to get them by finding improvement points
- 4) Creative
  - a) Quickly create a large number of ideas using Checklists Method and TRIZ
- 5) Evaluation
  - a) Perform a feasibility assessment through simulation if necessary with expert help
- 6) Development – Not mandatory
  - a) Run when you only need to supplement your ideas
- 7) Presentation – Same as the original phase
- 8) Post-Study
  - a) Certification of external organizations for VM artifacts

- b) Provide incentives for VM project team members

## **The background and drawbacks of energy plant O&M business at the public enterprise**

The company has developed a variety of bottom-up style activities such as individual department proposals, TPM, 6-Sigma, utilization of best practices, and application of Smart Factory technology to improve power generation efficiency and operational capability. These activities, however, have the following limitations as operational innovation activities which are mainly used in the facilities / equipment industry.

- 1) There is a difficulty in managing integrated improvement activities in units of power plants. In other words, it is difficult to know whether it was ultimately reflected in the management performance of the power plant when the results of the local activities of the experts in each field were collected.
- 2) Improvements to individual departments are effective in the department, but they can be ineffective or inefficient throughout the plant.
- 3) There is a difficulty in presenting a mid- to long-term and specific vision for improving management performance at the power plant. This is because there are many cases in which individual improvement activities are not closely related to KPIs (Key Performance Indicators) reflected in the master management plan of the plant.

## **The review of success story of a VM process of the equipment business company**

Value Methodology to Improve factory profitability applied to P company (Equipment industry):

- P company is a global top 5 steel company operating integrated steelworks both in Korea and overseas. There are two integrated steelworks in Korea with more than 70 factories. The average sales of one factory is about 1 billion US dollars, which is the size of a typical medium-sized company in Korea.
- The feature is that the VM process is applied to each factory in accordance with the characteristics of the equipment industry with a high raw material ratio and various maintenance costs and energy costs.

Features of the VM process:

- 1) Through the Target Cost Analysis, we developed information on all the costs used in the factory by function, and carried out the analysis without loss of 1 cent. In order to do this, it is necessary to arrange the cost items by investing about one month (depending on the number of cost items) with "Cost" related departments in the initial stage.
- 2) All the activities performed at the factory are reviewed naturally by analysis of Functional Perspective on the individual process and between processes through "Function Definition", "FAST Analysis" and "Function-Cost Analysis" of the Function Analysis phase.

VM project result of P company:

- Prior to the introduction of the VM process, the "Bottom-Up" style innovation activities added about 5 million US dollars of profits in one factory, but after its introduction, it added 8 million to 13 million US dollars of profits.

- We introduced VM process to all domestic factories and Indonesian corporation for 6 years, and we achieved a lot of accomplishments. We could have added about 2% (8% → 10%) of P company's OP margin.

### **The developed VM process for the energy plant O&M business**

- 1) Replace one plant of P company with one power plant of the public enterprise:  
To effectively apply the VM process, the process of the power plant is classified considering the material flow.
- 2) Match all the cost information of the O&M business of the enterprise with the function:  
To convert into the cost, reflecting the flow of material, to match all cost information of an energy plant to function of the plant.
- 3) 7 Systems (Processes) 1 CFT (Cross Functional Team) describes all the functions and costs of the power plant
  - ① Raw material supply system (i.e. landing stage → coal store)
  - ② Combustion / ventilation system
  - ③ Exhaust gas and environmental equipment system
  - ④ Multiple / water system
  - ⑤ Boiler / turbine system
  - ⑥ Sea water circulation system
  - ⑦ Transmission system
  - ⑧ Indirect departments

※ Inadequate parts can be corrected or supplemented

### **Conclusion: improved and expected effects of the VM process of the public enterprise**

- Construction business of the company
  - 1) Clearly distinguish between the design VM and the construction VM:
    - I. It avoids redundant review and maximizes work efficiency of participants.
    - II. Since detailed review can be made at the construction stage, it is possible to create added value by reducing costs and shortening the construction period.
  - 2) Strengthening the Information Phase:
    - I. In the Design VM, it is possible to further examine the internal and external information, new technology, patent, competitor, and smart factory technology considering power generation efficiency.
    - II. In the Construction VM, construction information, new equipment, process analysis, construction period reduction, supplier analysis can be further reviewed.
  - 3) Based on the enhanced Information Phase, not only does it significantly increase the amount of ideas compared to existing processes, but also broadens the scope of thinking for participants in the Creative Phase
  - 4) In the Creative Phase, the Checklist method and the construction-related TRIZ technique were added to the existing brainstorming technique, and the speed and amount of finding ideas of the participants increased

5) In the post-study, it is possible to improve the objectivity and credibility of the VM tasks that have been carried out through external evaluation and certification of the VM's main outputs.

- O&M business of the company

The public enterprise's Operational Innovation, bottom-up style, is expected to have the following effects by appropriately combining top-down and bottom-up styles through Value Methodology that uses the concept of target cost.

- 1) Reduce energy generation costs by more than 10% and generate additional revenue
- 2) Establish O&M management system based on target cost system operation
- 3) It is possible to enhance enterprise-wide profitability and present specific vision.
- 4) Because of the ability to manage profitability across the enterprise, it is possible to develop the operating technology of the plant powerfully. (i.e. clarifying the priority of investment)