

PRACTICAL TARGET COSTING WITH 3-STAGE VE PROGRAM

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ABSTRACT

A business establishes the target cost of a newly developed product to realize its profit plan. To achieve this target costing plan is the business' most important management task. But since the household electric appliances industry has been matured and is faced with stiff competition, firms have to set a strict cost target and find much difficulty attaining their target costing plan. This paper analyzes and assesses a case of the target costing activities--the activities for realizing target costing plans--which have been carried out since 1994. It then proposes a practical "system of target costing and VE activities" for attaining the target cost.

MANAGEMENT RESPONSIBILITIES FOR TARGET COSTING AND VE ACTIVITIES

With the globalization of the economy, the household electric appliances industry in Japan has experienced sharp falls in product prices (so-called "price destruction") and keener competition in new product development. On the other hand, the life cycle cost is rising to meet the need of protecting the global environment, while the cost of quality assurance is increasing to offer a higher product reliability. In such a situation, it is growing increasingly hard for a business to achieve its target profit plans.

The main management problems a business should tackle to attain its target profit are (1) sales growth by new products, (2) substantial

reduction in total costs, and (3) shortening the lead-time. To find good solutions to these problems, it is an important policy for the firm to develop new products attractive to consumers and realize the target cost for these products.

For this purpose, a business should carry out systematic target costing activities from the initial stage of new product development. These are target costing activities and we unify target costing and VE in our cost saving activities. The unified target costing and VE activities are defined as follows:

"Company-wide activities for creating the target cost at the stages from product planning to the start of manufacture, using VE and other techniques and going up to the origin of cost, while meeting a variety of customer needs, such as functions, quality, price and delivery schedule, for the purpose of attaining the profit plan of a new product, which is needed for a management plan."

TARGET COSTING AND VE ACTIVITIES AND IMPROVEMENT MEASURES

Figure 1 shows an example of changes in materials cost, which accounts for about 60% of the manufacturing cost, at the stages of new product development.

As Figure 1 shows, the target cost is achieved at the stage of basic designing as a result of the accumulation of VE proposals. But as the development process advances to detailed designing, manufacturing preparations and the start of manufacturing, the cost gradually increases as the designing specifications are determined more clearly

and changes in designing are made. These cost rises become greater than the accumulated value of the cost reduction achieved by VE activities,

resulting in a failure to attain the target cost at the stage of production start. The cases like these were frequently observed.

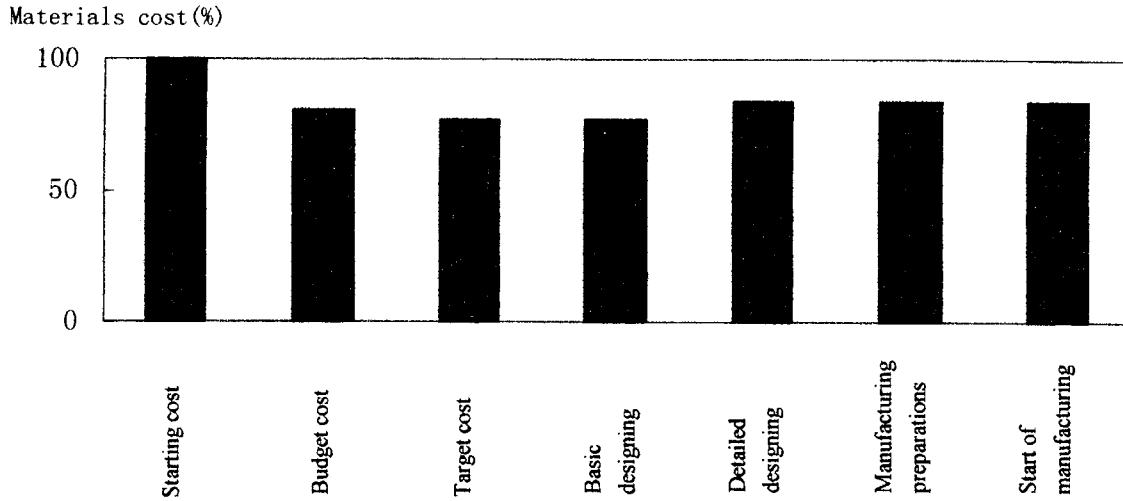


Figure 1. Changes in Costs at the Development Stage

Note: The term "accumulation" as used in this paper means the process in which the manufacturing costs estimated for each of the parts of a new product on the basis of technical calculation, the manufacturer's estimate and other supporting data are added up ("accumulated") to establish the total manufacturing cost of the new product. VE proposals for cost reduction are taken into consideration in this process. Variations of this word (accumulate, accumulated, etc.) have the same meanings according to their respective parts of speech.

To overcome this problem, the author

analyzed the cases of target costing and VE activities, which were started in 1994. The results of this analysis are summarized in Table 1 below dividing them into problems, causes and improvement measures from the viewpoint of cost management, target allocation, VE activities, design changes and purchase at lowest price.

The details of the measures for improvement shown in Table 1 are included and explained in the section of the "Practical Target Costing and VE Activity System" below.

Table 1 Target Costing and VE Activities and Measures for Improvement (1)

Problem	Cause	Measure for improvement
1. Unclear cost management in the transition of development processes	Go to the next process without achieving the target cost (basic designing→detailed designing→pre-manufacturing designing→manufacture 1. Incorrect cost estimate 2. Inadequate performance of the recovery promise at a subsequent process	1. Completely implement the 3-Stage Development Target Completion VE Program synchronized with the development process (Conceptual-VE, Designing-VE and Pre-Manufacturing-VE) 2. Construct the development process transition cost checking system (implement a "gateway control system," that is, the system not allowing to move to the next process if no target cost is achieved.)

Table 1 Target Costing and VE Activities and Measures for Improvement (2)

Problem	Cause	Measure for improvement
2. The set value of the target cost changes	1. Estimated selling price is incorrect, necessitating lowering of the target cost.	Carry out the evaluation of selling price/function for each function at the stage when the product concept is formed
3. No VE proposals are implemented	1. The development term is shortened and the VE proposals cannot be implemented before the designing stage.	Construct the system for the early development of wait-&-bunt VE technique.
	2. The adoption of the VE proposals very hard to implement is postponed	
4. Insufficient VE ideas	3. No VE proposals by the cost review (CR-VE) are implemented.	Create a pricing examination system for new parts and follow up the implementation of VE proposals.
	1. Inadequate collection of VE information	1. Strengthen the tear down analysis of competitor's products. 2. Expand VE break-thoughts into public competitive VE bidding, public bidding, exclusion of special specifications, etc.
	2. The plan of basic designing commensurate to target cost cannot be drafted.	Develop ideas by introducing new VE related techniques (DFA, TRIZ, etc.)
	3. Inadequate functional analysis	Implement functional analysis on priority basis.
	4. Inadequate cost analysis	Strengthen the cost analysis function of the "Parts Target Costing Table".
5. Inadequate VE activities for dealing with design change	1. Imperfect designing	Secure sufficient time for Conceptual-VE to achieve perfect designing and to improve Conceptual-VE.
	2. Inadequate accumulation of VE proposals considering design change	Make the target value lower than the estimated value: Target value = 0.95 x estimated value.
	3. Inadequate examination of VE for parts with design change	Completely implement the cost review (CR-VE) of parts with design change.
6. Observance of target allocation	1. The target allocation to related sections and the plan to implement VE proposals are not determined clearly and are not carried out	Strengthen the function of the "Parts Target Costing Table", convince the sections in charge of the target allocation and ask them to implement VE proposals.
7. Delay in changing orders to new manufacturers offering the lowest price	1. Lack of trust in new manufacturers (for quality, delivery schedule and troubles)	Positively increase the adoption of good new manufacturers (renew consciousness through disclosure of information).

DESIGNING THE SYSTEM FOR PRACTICAL TARGET COSTING AND VE ACTIVITIES

Target costing activities are those to which

all the divisions of a business are committed at the stages from product planning to the start of manufacture. To design a practical system for target costing and VE activities which would promote these

activities by all the divisions concurrently, effectively and efficiently, we think it necessary to adopt the Plan-Do-Check-Action Cycle as a basic method and to follow the steps described below:

- (1) Make a scenario for achieving the target cost and create an activity control system for systematic implementation and management of the scenario. Then analyze and assess the results of activities to find differences with the initial plan and use them as data for future improvements.
- (2) Evaluate the accumulated cost in the transition to the next development process and carry out milestone management to determine whether to move to the next process or not. Establish the system in which if the target cost is unlikely to be realized, it will be impossible to move to the next process without the decision of the top management. This system will provide an activity project with tightness and have good effects on the promotion of cost reduction activities.
- (3) Clearly define the content of VE activities to be implemented at each development process. For this purpose, draw up and implement a 3-Stage Development Target Completion VE Program (described later).

Development process	Basic designing	Detailed designing	Pre-manufacturing designing
3-Stage VE	Conceptual -VE	Designing-VE	Pre-manufacturing-VE

- (4) As a means to achieve the target cost, divide it by function, part, cost element, section, person in charge and manufacturer and allocate it.
- (5) VE activities should be carried out as the project activities that can be implemented concurrently by the participation of the members of all the sections concerned, including sales, research, product planning, designing, materials, manufacturing, production technology, VE center and cost management. The person responsible for designing should serve as the project leader.
- (6) The cost management of new products should be carried out by the three-stage regular meetings described below:

As for the promotion and management of daily VE activities for important new products, the "target costing and VE promotion meeting" should check the situation of achievement of the target cost and promote VE activities mainly for each part according to the "Parts Target Costing Table"

described later.

For the promotion and management of cost reduction activities for all the divisions, the "cost reduction meeting" attended by executives should check the situation of the monthly cost reduction of main product models for the period concerned and that of achievement of the target cost of important new products and promote cost reduction and target costing activities.

For the income and expenditure management of each product and model, the "product income and expenditure meeting" attended by the leaders of the division should check the achievement of the target income and expenditure and promote activities for attaining the target.

Target costing activities should be carried out at the development stage where about 90% of the product cost is determined. In addition, to ensure the priority-based input of management resources, these activities should lay greater stress on important new products with a bigger contribution to profit.

ESTABLISHMENT AND ALLOCATION OF TARGET COST AND VE ACTIVITIES

The target cost should be established and allocated to achieve considering the following two points:

- (1) The target cost is the one that should be realized at all cost by "special efforts" to gain the target profit. Considering possible cost increase as a result of design change etc., it should be set, for example, at 90% to 95% of the estimated value of income and expenditure.
- (2) The target cost should be allocated by strategically dividing it and in a systematic way. The responsibility for achieving the target should be clearly defined, and the target cost should be allocated as that to be attained by VE activities, etc.

The process of setting the target cost begins with the use of the "deduction method" by which the target is determined by deducting the target cost from the target selling price:

$$\text{Target cost} = \text{target selling price} - \text{target profit}$$

But in some cases, the target cost set by the above equation is too low to be realized by special efforts.

Product functions, selling price, cost and term have by nature the relationship of trade-off among them. Therefore, the accumulated cost obtained by incorporating VE ideas should be estimated as soon as possible for the product functions and selling price which are determined at first. The difference between this accumulated cost

and the target cost is the value not accumulated yet, which is the target of cost reduction. If this value is too high to be attained even by special efforts, the product functions and selling price are reviewed repeatedly through Conceptual-VE activities. A good method for assessing product functions and selling price is the technique the author's his paper presented at the 1990 SAVE International Conference: "A STUDY OF MARKETING VE BASED ON EVALUATION OF CUSTOMER NEEDS".

As noted above, the deduction method is first used to establish the target cost. Then the synthesis method is applied to make adjustments among the accumulated cost incorporating VE ideas, product functions and selling price (Experiences suggest that in Conceptual-VE, the accumulation of VE ideas is needed up to 90% of the target cost).

This relationship is shown in Figure 2.

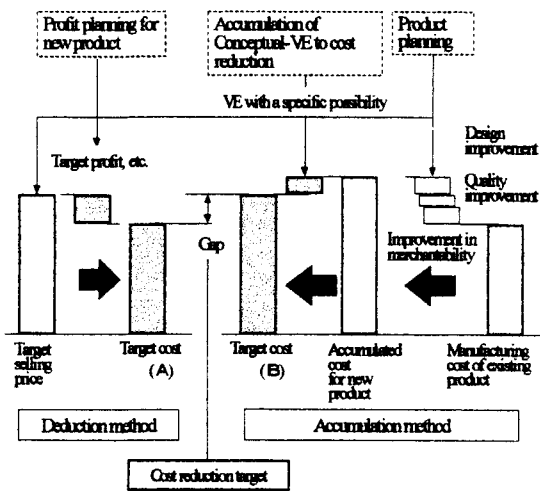


Figure 2. Establishment of the Target Cost by Synthesis

The allocation of the target cost aims to define clearly the section and person responsible for activities for achieving the target to ensure the systematic accumulation and implementation of VE ideas and other related activities and to manage these activities.

The target cost is allocated for each function, structure, part, cost element (materials cost, processing cost), organization, person in charge and manufacturer. The allocation should be made taking account of the VE ideas accumulated by the VE project and be approved by the section and

person in charge.

These activities and management work are carried out using the "Parts Target Costing Table" which summarizes information on cost and VE ideas for each part.

The "Parts Target Costing Table" is designed so as to serve as a management database for target costing and VE activities and has the following functions:

- (1) It shows, for each type of parts, the situation of cost reduction results as against the target cost as well as the projected cost.
- (2) It makes it possible to add up and analyze the cost for various purposes fit for the viewpoints (approaches) of cost reduction.
- (3) It contains data on the target cost, assessed cost, latest accumulated cost, VE idea, persons in charge of VE and others, for each type of parts. It is possible to disclose these data to those concerned via PC networks, thus sharing the information with these people and promoting VE activities.

Figure 3 shows the relations of the functions of the "Parts Target Costing Table."

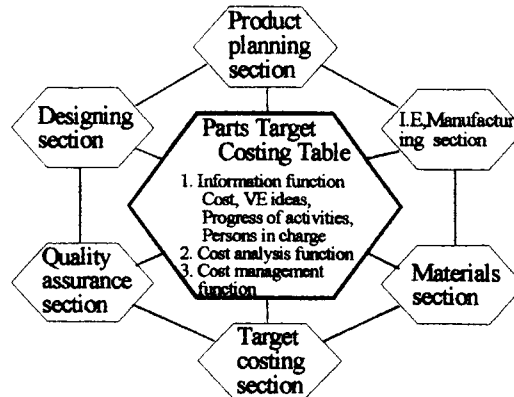


Figure 3. The relations of the Functions of the "Parts Target Costing Table"

3-STAGE DEVELOPMENT TARGET COMPLETION VE PROGRAM

The 3-Stage Development Target Completion VE Program is designed so as to carry out, in a timely way according to the development process, various cost reduction activities, including the evaluation of product functions, weight reduction, reduction in the number of parts, standardization and use of common parts, elimination of special specifications and purchase at the lowest price.

Figure 4 show the activities to be implemented at the 3-Stages: Conceptual-VE, Designing-VE and Pre-manufacturing-VE.

Stage of activities	Contents of activities
I Conceptual-VE	Evaluation of product functions, allocation of the target cost to each function, structure and organization, cost reduction planning and achievement of the target cost → Move to the detailed designing
II Designing-VE	Allocation of the target cost for each type of parts, selection of the manufacturer offering the lowest price using a draft plan for parts and achievement of the target cost for each part type by VE activities in cooperation with the selected manufacturer → Move to pre-manufacturing designing.
III Pre-manufacturing-VE	Achievement of the target cost for each part type VE activities in cooperation with the selected manufacturer offering the lowest price using a detailed plan for parts → Move to manufacturing.

Figure 4. 3-Stage Development Target Completion VE Program

This VE program has the following characteristics:

- (1) It includes a development process transition cost checking system. If upon the completion of Conceptual-VE, Designing-VE and Pre-manufacturing-VE it is considered unlikely that the target cost will be realized, it is made a rule not to move to the next designing process, that is, to achieve a target cost at each VE stage. In this way, the program positively promotes VE activities.
- (2) Achieving the target cost of a new product means achieving the target cost of the existing and new parts that compose the product. This program divides the target cost into the one for existing parts and that for new parts and allocates a higher target to new parts in an attempt to realize a strategic cost reduction.

The VE program for new parts is a special one named Cost Review VE (CR-VE) Program activities. Figure 5 shows the concepts of this VE program.

- (1) Select the best manufacturer, show the target cost to the selected manufacturer and perform VE activities in cooperation with the manufacturer from the stage of Designing-VE and Pre-manufacturing-VE to realize the target cost.

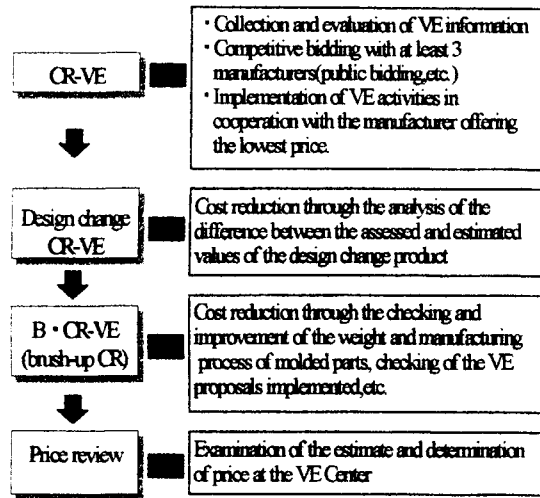


Figure 5. The Concepts of Cost Review VE (CR-VE) Program

- (2) Design change often occurs for new parts. Formerly, the manufacturing of new parts was started with inadequate VE examination of design change. So design change became the main subject of cost reduction activities during the manufacturing process and produced opportunity cost. This VE program includes design change, too, and assesses the cost of design change. Then design change CR-VE activities are carried out in cooperation with the manufacturer. But these VE activities cannot cover all of the cost increase resulting from design change. Considering this problem, when the target cost is established, the target value is set lower by about 5% to 10% than the estimated cost.
- (3) When parts are manufactured using the final mold, the weight, processing process, etc. of the parts are examined to make sure that VE ideas have been applied and the amount of cost reduction achieved is checked.
- (4) Then whether or not the results of the VE activities are reflected on the cost and the cost is the best one is studied and the unit price is determined.

SUMMARY WITH A FUTURE PROSPECT

Since 1994, we have worked to create a "target costing and VE activity system" in an effort to realize the target profit established by the management plan and to achieve the target cost set for new products.

Based on this experience, we have constructed the practical "target costing and VE activity system" which includes the "3-Stage Development Target Completion VE Program." This system has the following characteristics:

- (1) It is a system for activities, which unifies cost management and VE.
- (2) It is a priority-based, concurrent system that starts from the product planning stage.
- (3) It allocates the target cost to each type of parts, thus involving many persons concerned and clearly defining the persons responsible for achieving the allocated target cost.
- (4) It includes a "development process transition cost checking system." The activities carried out by this system aim to realize the target cost at each of the three stages and require special challenging efforts.

The successful cases where this system was applied include the "Yasai-Chushingura" refrigerator manufactured and released in 1996 by Hitachi. This product was a big hit with unique features.

To design the refrigerator, surveys were conducted to know the frequencies of using the freezer, cold room and vegetable compartment respectively and these were arranged in order of the frequency: the cold room on the top, the vegetable compartment in the middle and the freezer on the bottom. Because of this, the refrigerator is easier to use. The main reason that it was a great success was the fact that it was sold at the market price despite of the additional features, thus offering a better product value to consumers.

Finally, our future tasks are outlined.

The "target costing and VE activity system" aims at realizing the target cost established. But in the case where design change begins to occur frequently at the pre-manufacturing stage, it is sometimes impossible to cope with the cost increase at this stage, resulting in the non-achievement of the target cost.

To deal with the causes of such non-achievement problems, there is the need of developing a new version of the system that will prevent subsequent design change and improve the management of the designing process.