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New Aspects of the Value Analysis Method Leading to a More Accurate Evaluation of the Industrial Products

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Abstract: The case of classical Value Analysis method, using only two degrees of comparison, "more important" - marked with "1" - and "less important" - marked with "0" might be subject to discussion because of the following reasons: Zero ("0") has no "material" signification meaning that a sensation of insatisfaction occurs to the one involved in a Value Analysis procedure. It is insufficient to use only two degrees of comparison. The paper, based an numerical models, proposes four degrees of comparison as being "the same importance", "much more important", "more important" and "less important", each degree of comparison being associated with figures or numbers, others then zero, in order to record the results of the comparison. We consider this approach as better corresponding to the natural needs of the potential users of the Value Analysis method and also we expect closer to reality results and conclusions.

Key Words: Value Analysis, New Approach, Better Accuracy

Introduction

The paper presents same critical points of view upon the determination of the functions importance level (n_j) and their weight (q_j) in the value of a product which is subject of a Value Analysis study. Some original proposals, to improve the accuracy of the Value Analysis method are also included in the paper.

Critical Analysis of the Common Value Analysis Method: Being given a product P with, for example, four functions F_j (j = 1,4), using a table like Tab. (1) the analyst and / or the user of the product compares, from the point of view of their meaning, every function F_j with all the other functions F_k giving marks ("one" or "zero") after the following rules: if the function F_j is considered more important then the function F_k, in the space k_j is written $e_{kj} = 1$; if F_j is less important then F_k, in the space k_j is written $e_{kj} = 0$. When k = j, we fill in $e_{kj} = 1$. Table (1) being completed, (n_j) results from Eq. (1) and q_j from Eq. (2).

$$n_j = \sum_k e_{kj}\ ; \qquad (1)$$

$$q_j = \frac{n_j}{\sum_j n_j}\ ; \qquad (2)$$

Table 1: Functions Importance Level and their Weight in the Value of a Product-common Value Analysis Procedure

k \ j	F1	F2	F3	F4
F1	1	1	0	0
F2	0	1	0	0
F3	1	1	1	1
F4	1	1	0	1
n_j	3	4	1	2
q_j	0,3	0,4	0,1	0,2

The "weak" points of the procedure are the following:

- Zero ("0") has no "material" signification meaning that a sensation of in insatisfaction occurs to the one involved in a Value Analysis procedure; in the same time every function is valuable, but it values less then another function.
- A function F_j compared with another function F_k is subject to only two degrees of comparison, "more important", marked with "1", and "less important", marked with "0", but people are commonly using all the degrees of comparison allowed by their mother tongue.
- The importance levels (n_j) have all the values between j = 1 and j = N, (N - the total number of functions of a product), in other words, the relative importance of the functions has a linear variation, fact which it's not normal to happen all the time.
- The ratio ($\alpha_{j\ max}$) between the importance of the best quoted function ($n_{j\ max}$) and the importance level of the worst quoted function ($n_{j\ min}$), Eq. (3), is always equal with the number of functions (N) of the product, fact that leads to a disproportion when (N) is great.

$$\alpha_{max} = \frac{n_{j\,max}}{n_{j\,min}} \qquad (3)$$

We have to remind that (n_j) through (q_j) is used to establish the cost of the various functions (C_j), Eq(4), Eq(5), Eq(6):

$$P_j = \sum_{a=1} a q_j \qquad (4)$$

$$P_j = C_j/CP \qquad (5)$$

$$C_j = q_i CP \qquad (6)$$

where (CP) is the total cost of the product and (Pj) is the weight of the function (Fj) in the total cost of the product.

Proposals for a New Approach of the Value Analysis Method: The authors consider that an improvement of the Value Analysis method might be achieved by taking into consideration the following proposals:

- The use of all the degrees of comparison of the language of the one involved in a Value Analysis procedure.
- The association of the degrees of comparison with the marks presented in Tab. (2).

Table 2: Proposed Groups of Marks for More Degrees of Comparison

Groups of Marks						Degrees of Comparison	Adjectives
1	1	1	1	1	1	(=) "as...as"	"important"
2	3	9	5	10	15	(>) "more"	"beautiful" "useful" "functional"
3	5	7	9	20	30	(>>)"much more"	"useful" aesthetics"

The comparison of the functions will be in this case the following; if $F_j=F_k$, in the space k_j we will write $e_{kj}=1$; when $F_j>F_k$ in the space k_j will be written $e_{kj}=3$; when $F_j >> F_k$ in the space k_j we will write $e_{kj}=5$, and for k=j results $e_{kj}=1$, Tab. (3).

Table 3: Functions Importance Level and their Weight in the Value of a Product - proposed Value Analysis Procedure

		j			
		F1	F2	F3	F4
	F1	1	5	1	1
	F2	1	1	1	5
k	F3	1	3	1	5
	F4	3	1	1	1
	n_j	6	10	4	12
	q_j	0,1875	0,3125	0,125	0,375

But in the operational process the analyst might say that F_j is "less important" or "much more less important" then F_k, fact that leads to say about the even function F_k that is "more important" or "much more less important". As a consequence in the space k_j will be written e_{kj} = 1and in symmetrical spaces j_k will be written e_{jk} = 3 or e_{jk} = 5.

Another aspect that focussed the attention of the authors was the variation of ($\alpha_{j\,max}$) for different sets of numbers used as marks. Table. (4) presents the variation of ($\alpha_{j\,max}$) for the following cases:

- Three products having the number of functions N_1 = 5, N_2 = 10 and N_3 = 30.
- One of the function was always given the smallest mark.
- Another function was always given the greatest mark.

Table 4: The Variation of $\alpha_{jmax} = n_{jmax}/n_{jmin}$

Marks	1;0	1;3;5	1;4;7	1;5;9	1;10;20	1;15;30
N_1=5	5	4,2	5,8	7,4	16	24
N_2=10	10	4,6	6,4	8,2	18,1	27,1
N_3=30	30	4,8	6,8	8,7	19,3	29

From Tab.(4) one can observe that (α_{max}) depends on the values of the marks, meaning that (α_{max}) gets a maximum around the value of the number of functions, ("N"), when the greatest mark is equal to the number of functions ("N").

We can say that even from this point of view the proposed improvements do not alterate the results of the "classical" Value Analysis method.

Conclusion

The present paper does not intend to present a new procedure but an improvement of the "classical" Value Analysis method. We do not put into discussion the basic Value Analysis concepts; on the contrary these concepts are underlined.

The proposal that, when making of the comparison of the functions, to use more degrees of comparison and to give them different marks represents the acceptance of the thinking way of the human subject - consumer or producer, asked to perform such an analysis.

Regarding the final result, i.e., the establishing of the importance level (n_j) and the weight of functions (q_j), it is sure that they will not have a liniary variation, fact closer to the reality.

Depending on the strategy of the product and the interests of the market, the analyst might use a convenient set of marks, Tab.(4) in order (α_{max}) to get a reasonable value.

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