# RESEARCH AS REGARDS THE POSSIBILITY OF COMPUTERIZING THE VALUE-ANALYSIS ACTIVITIES FOR PRODUCTS

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**Abstract.** The activity-computerization process has stood out as an efficiency-enhancement modality through general advantages such as: diminution of the information-processing duration through increasing the computation speed, elimination of the calculation errors, storage of a great data volume, their rapid transfer, systematization and rigorous control of the information etc. Within the work, the premises and the results of the researches upon the possibility of computerizing several specific activities to value analysis for products are submitted.

**Keywords:** computerization of value analysis activities, CostMaster

## 1. Introduction

In the framework of the paper herein, the premises and outcomes of the research as regards the possibility of computerizing several specific activities to value analysis for products are submitted, through designing and achieving a viable information technology product as regards the application of value analysis to products.

The necessity of designing the information technology product resulted from the studies and researches deployed over the individual training and educational program for elaborating the doctoral thesis [5].

The objectives pursued through designing the information technology product for the activities of value analysis were:

- designing a database that should supply the necessary information for distributing the costs according to the functions of the products;
- ensuring the rapid access of the working group to the information in the database, in order to shorten the realization duration of the value-analysis study;
- rapidly processing the information and simulating different computation variants, to the purpose of rendering more efficient the activity of optimizing the ratio between the usage value and the production cost of the functions.

Computerizing the value-analysis activities is appropriate as it allows to centrally register and to systematize the study-necessary information, to store and rapidly transfer the information, to eliminate calculation errors though their automatic achievement, to easily apply the method, both for the products already existing in the company's manufacturing nomenclature and for those in the design phase.

## 2. General frame necessary for designing and achieving the information technology product

Achieving the algorithm of the IT product was underlain by analyzing the stages and phases of the methodology for applying the value analysis to products from the standpoint and necessity of computerizing them [2, 3, 4].

Stage I – Preparing measures [4], with the five phases (Theme setting, Working team organization, Methodological preparation, Work plan establishment, Work plan approval), is the stage wherein the objectives of the study are set and the conditions are created for organizing and managing the specific activities. The activities of this stage were not enclosed within the IT product, due to their specificity – mostly descriptive, informative.

Stage II – Analysis of social necessity [4], is the stage wherein (general, technical, economic) information are collected, referring to the product that will make the object of the value analysis. Within this stage, the product is defined through the functions it accomplishes; and the functions are quantified so as to determine the global usage value of the product. This stage envisions three phases: Collecting the information; Setting the function nomenclature and the limits of their technical dimensions; Establishing the importance degree of the functions.

After analyzing the content of this stage, the necessity ensued of designing databases that should enable the value-analysis team's access to the study-necessary information.

Consequently, there was necessary to design databases that should contain technical information (enhancing the product-manufacturing process, detailed on operations and phases for every component part) and economic (manufacturing costs detailed on cost elements, for every product, component parts, for every real or designed processing operation) adequately structured for achieving the value-analysis study. Additionally, there was called for creating a database that should enable characterizing the product under the aspect of the functions it fulfils and that should contain information on the relative importance levels of the product functions.

Stage III – The analysis and the evaluation of the existing situation provides, in the framework of the three phases, setting the technical dimension of the functions, establishing the economic dimension of the functions and systemically analyzing the functions [4]. The specificity of the activities that consists in technically sizing the functions was detailed in [1] and they were not included within the IT product because of their descriptive, informative character. Economically dimensioning the functions supposes specific activities, such as:

- *Setting the cost structure of the product*, as detailed as possible – on categories of costs and according to the stage of the product: conception – design (after establishing the manufacturing technology, in order to determine the consumptions);
- *Distribution of the costs on functions* – complex activity that supposes, on one hand, engineering reasoning as regards establishing the relations between the functions of the product – material carriers (components of the analyzed product); functions of the product – material carrier-achievement operations. On the other hand, the distribution activity supposes a specific algorithm for allotting the costs on the product functions.

Due to the complexity of the economic-dimension establishment activity for the functions, its inclusion within the IT product was deemed appropriate.

The systemic analysis of the functions aimed at enhancing the much too costly functions as compared to their contribution to achieving the usage value, or at enhancing the too costly functions as against the others [1, 2].

Considering the above-presented information and facts, the creation of an information technology sub-routine interconnecting the previously designed databases and facilitating the specific algorithm that allots the costs was deemed appropriate.

Likewise, there was called for computing and graphically enhancing the correlation between the considered parameters: usage value of each function, expressed through the relative importance level and through the production cost.

Stages IV – Conceiving or re-conceiving the product, V – Approving the optimal solution and VI – Achieving and controlling the application, in the framework of the methodology for applying the value analysis to products [4] were not enclosed within the IT product, due to the specificity of the activities, mainly descriptive - informative.

The flowchart for achieving the computerization of the value-analysis activities for products (new or already existing) is shown in figure 1 and synthesizes the above-mentioned facts and information. The designed information technology product refers to the case in which the studied object is already present in the company's manufacturing nomenclature. Consequently, the blocks 3, 5, 8, 9, 11, 13, 14 pertaining to the logical flowchart were included in the algorithm of the IT product.

In order to obtain the data necessary for distributing the costs on the functions of the product and for simulating various computation variants, to the purpose of optimizing the ratio between the usage value and the costs of the functions, the creation of a database was required so as to enhance the entities and the relations among them.

The designed database was improved to optimum (bringing the tables in the Boyce-Codd form, validating and defining the identity rules of the database) by going through the stages [5]:

Stage 1. Creating the local conceptual model of the data, from the user's standpoint

1.1 Identifying the types of entities;
1.2 Identifying the types of relations;
1.3 Identifying the attributes associated to the entities;
1.4 Determining the domains of the attributes;
1.5 Determining the candidate keys and the primary keys;
1.6 Specializing/generalizing the types of entities;
1.7 Elaborating the diagram of the model Entity Relations (figure 2).

Stage 2. Creating and validating the local logical model;

2.1 Designing the local conceptual model in the local logical model;
2.2 Creating relations for achieving the local logical model;
2.3 Validating the model using the normalization;
2.4 Defining the integrity rules.

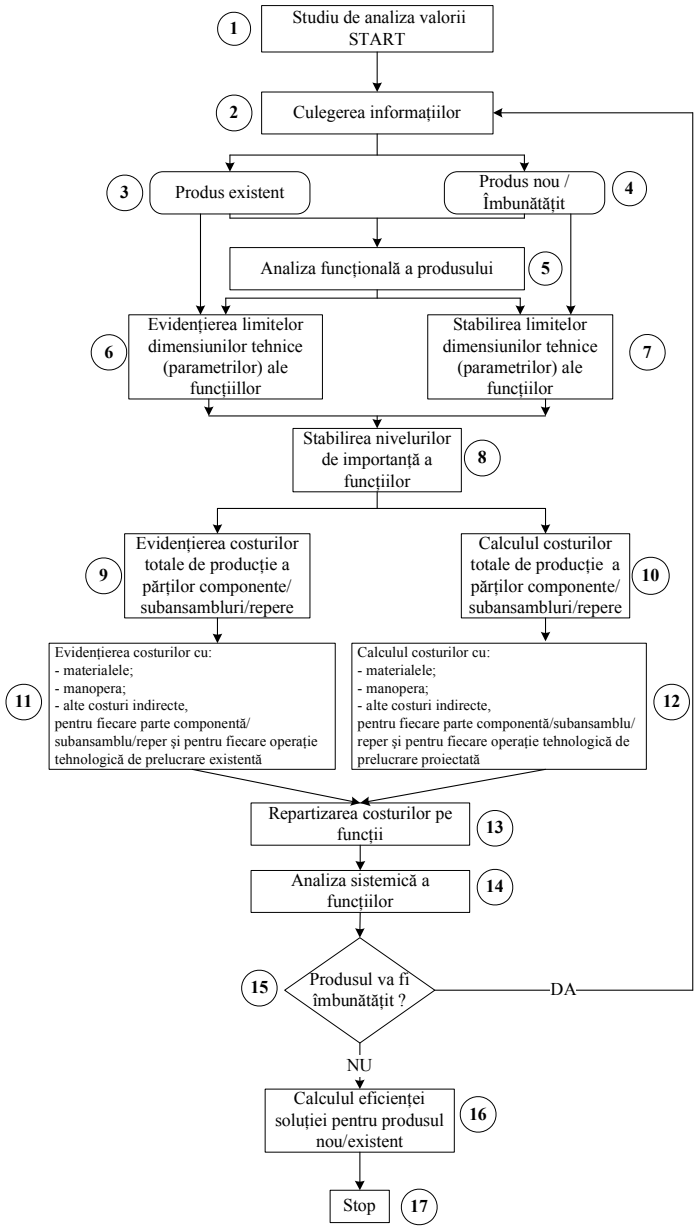


Figure 1. Flowchart for achieving the computerization of the value analysis for products

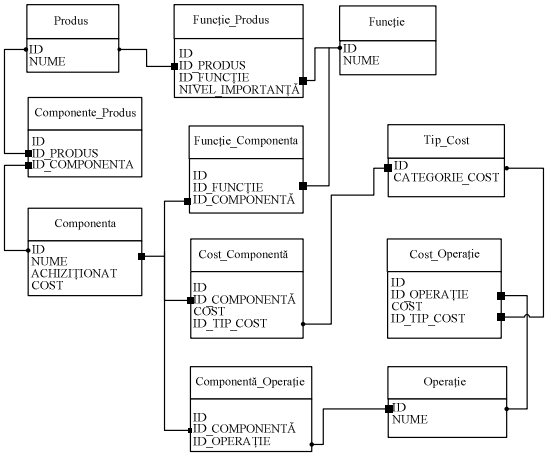


Figure 2. Diagram of the model entity - relations

For effectively implementing the database, the software MySQL was used.

## 3. Results of the research

Following the conducted researches and the above considerations, the information technology product CostMaster was designed, mainly destined for computerizing the value-analysis activities for products.

The application CostMaster was structured on two main menu-s: menu Add and menu List.

The menu Add (figure 3) allows introducing the primary information (the nomenclature of functions, the data resulted from processing the

surveys), the technical and economic data necessary for creating the databases, as well as defining the associations among the databases.


Figure 3. Options of the menu Add within the application CostMaster

This menu consists of the following sub-menus, as follows:

- **Products** – it allows introducing the name or the code of the product;
- **Components** – it allows specifying the name of the component in the afferent field. Because many companies acquire from third parties certain components of the manufactured products, the application allows specifying this aspect through checking the option **Acquired.**

In this case, in the field **Cost,** the acquisition value of the respective component part is entered.

If the respective component is manufactured in the company wherein the study is achieved, in the field **Cost,** the value 0 (zero) is entered and the option **Acquired** is not checked;

- **Association Components - Product** – it allows specifying the product components, through their association, in the studied product, as within the database, other component parts than those pertaining to the studied product may exist;
- **Operations** – it allows specifying the product and component part processing operations;
- **Functions** – it allows specifying the product functions corresponding to the methodology of the value analysis (name, description, code – as the user desires);
- **Associations Product – Functions – Level of importance –** it allows associating the studied product with its functions and allotting the relative level of importance for every function. The relative level of importance is previously determined; as a result of statistically processing the data resulted from surveying the experts, the product users;
- **Associations Functions - Components** – it allows associating every component of the studied product with the functions that it participates in. Settling these relations is done on the basis of the technical, engineering reasoning, within the working group;
- **Associations Operations - Components** – it allows allotting the technological operations for achieving every component part of the product;
- **Types of cost** – it allows specifying the categories of costs used within the value-analysis study;
- **Costs Components** – it allows allotting the categories of cost used within the study to every component part of the product, specifying the afferent values come from the accounting documents;
- **Costs Operations** – it allows allotting the categories of cost used within the study to every operation necessary for the components of the product, specifying the afferent values come from the accounting documents.

The menu **List** (figure 4) allows accessing, viewing and achieving the possible subsequent modifications of the previously created databases


Figure 4. Options of menu List within the application CostMaster

The names of the options of the menu **List** are the same as in the menu **Add**. Accessing any option from the menu **List** allows (figure 5):

- ❖ Viewing the information from the previously created database;
- ❖ Modifying the information in the database, through accessing the button **Modify**.

The connection from the active window with the menu **Add**, through accessing the button **Introduce a new** ...., according to the name of the active window.

Additional to these facilities, accessing the sub-menu **Products** within the menu **List** allows the user to access the options:


Figure 5. Facilities offered by the options of the menu List within the application CostMaster

a. Sub-menu **Details Cost Product**... allows viewing the overall production costs for every product and detailed, for every component part, on cost categories. This way, a global image upon the situation of the product costs may be obtained according to the primary data introduced within the corresponding databases (figure 6).


Figure 6. Hierarchical structure on cost categories for the studied product

b. The sub-menu **Distribution Costs Product** (figure 7a) allows computing the distribution of the costs of the product component elements on the functions in whose realization it participates and viewing this situation in table format (figure 7b).

The cost category that is distributed on functions, according to the computation algorithm, is chosen from the scroll menu which opens above the panel.


Figure 7a. Option Distribution Costs Product

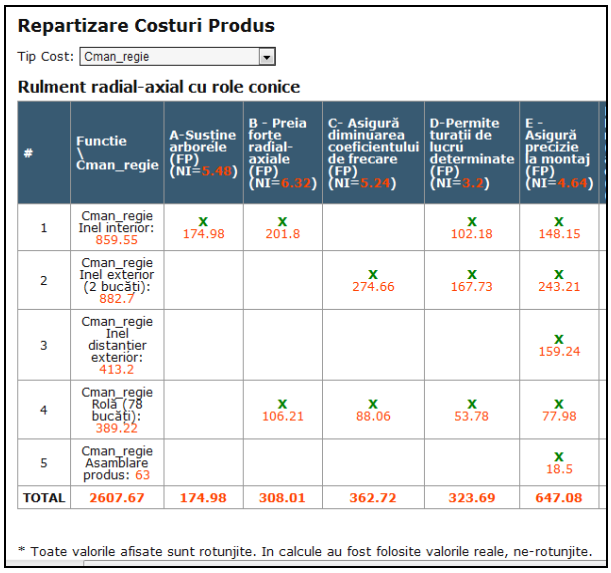


Figure 7b. Distribution panel (partial) of the cost categories on the product functions

**c.** The sub-menu **Distribution Costs Functions Product** (figure 8a) allows computing the total cost for every considered function and achieves the systemic analysis of the product functions, with the possibility of viewing the obtained results in graphical format (figure 8b).

The IT product CostMaster allows automatically updating the results displayed within the options **Details Cost product**, **Distribution Costs Product**, **Distribution Costs Functions Product**. This way, at any modification of the data within the databases, the premises are created in order to simulate different real situations for characterizing the product from the standpoint of the total cost for the achievement of its functions.

## 4. Conclusions

Following the researches as regards the possibility of computing the value-analysis activities for products, the following conclusions may be outlined:

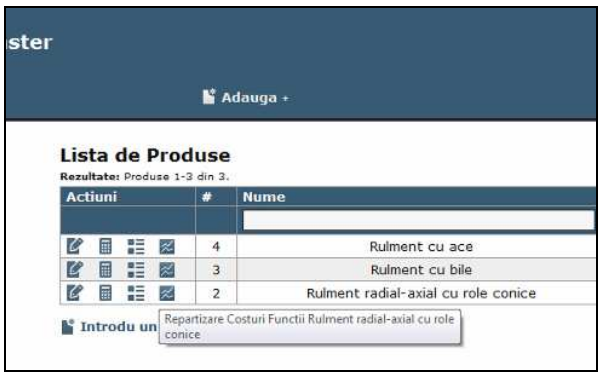


Figure 8a. Sub-menu Distribution Costs Functions Product

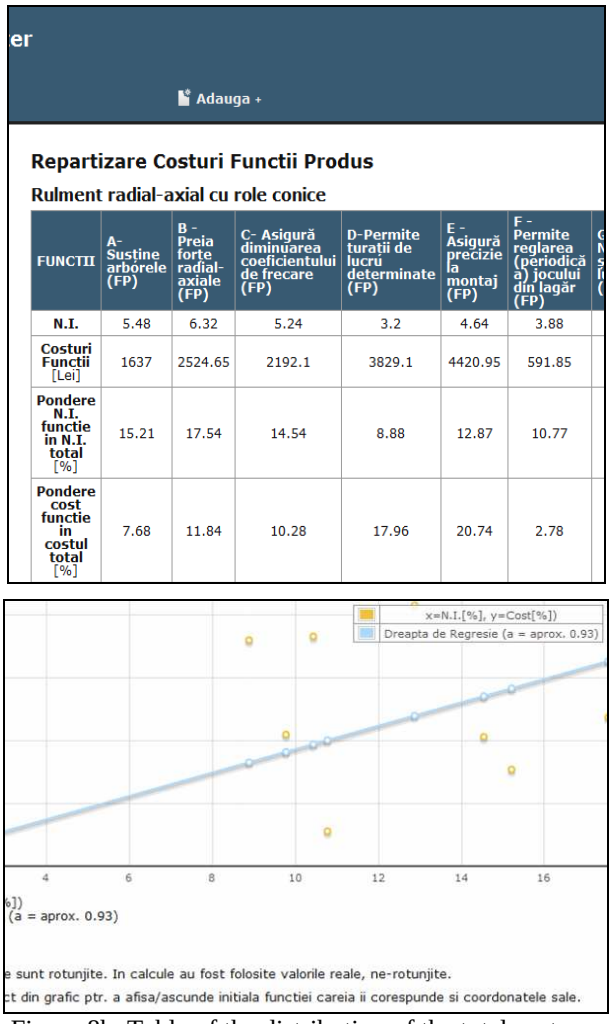





Figure 8b. Table of the distribution of the total costs on the product functions and corresponding graph

1. In the process of value analysis, four stages or phases were identified, requiring the algorithmization;
2. The database contains a series of information, primary data, referring to the constituency, manufacturing technology, cost structure of the product;
3. The database contains information as regards characterizing the product through the functions it fulfils and through their relative level of importance;
4. The designed information technology product for achieving the value-analysis activities proves its usefulness through:
   - achieving in a shorter while some value-analysis stages or phases;
   - creating an overall vision upon the entire process;
   - achieving the analysis upon the correlation between the usefulness value and the production cost of every function, pointing to those over-dimensioned functions from the standpoint of the achievement cost in relation to the usage value or in relation to other functions of the product;
   - The possibility of modifying the costs of the product components (on cost categories), afferent to the over-dimensioned functions so that, for the analyzed product, a satisfying proportionality should be obtained (as close to the medium proportionality line as possible) between the useful value and the cost of the function;
   - achieving an efficient control of the obtained results;
   - the created information technology product was validated by running several data sets; the created IT product stands for a first step in improving the value-analysis activities.

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