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ASPECTS ON THE ANALYSIS AND QUANTIFICATION OF THE QUALITY OF PRODUCTS, WORKS AND SERVICES (I)

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Abstract: *The article is reasoning the importance of a new concept in production management, namely Products / Works / Services. In the context of this new concept, more comprehensive than the term used in the literature, of goods and services, the analysis and quantification of quality is particularly important. This article presents two methods of analysis and quantification of the quality of Products / Works / Services, namely: quality (spiral) loop and value curve (price, benefits) - quality. The main phases (stages) of the quality loop are analyzed: market study; conception-design-development; manufacturing preparation; tracking the behavior of Products / Works / Services in operation. Value Method (Price, Benefits) - Quality is presented and analyzed in the context of a computerization action of a company. The reasoning of the importance of this method is based on the main needs of such an action: the use of specialized and high performance software; operation with very large files (memory). The article also presents, both analytically and graphically, the mechanism for establishing quality in the market.*
Key words: *Production Management; Quality Quantification; Quality Loop.*

1. INTRODUCTION

In the literature specific to different fields (management, quality, production, trade) the term goods and services is usually used. The authors of this article, in their research, introduced and developed a new, more comprehensive concept, called Products /Works/ Services, abbreviated P/W/S [1,2].
The importance of this new concept lies, in addition to its larger area of coverage, in the fact that it puts production first. And according to a paraphrase “If there is no production, there is nothing!”.
The cycle of achieving the quality of a P/W/S takes place throughout its "history", ie starting even before that P/W/S physically exists (the phase of conception, design, contracting) and continuing even after The P/W/S came out on the company's gate (warranty service, post-warranty service and the most important aspect is following the behavior of the P/W/S in operation) [3,4].
The analysis and quantification of quality methods that we will present in this article are: loop (spiral) of quality and curve value (price, benefits) -quality.

2. QUALITY LOOP (SPIRAL)

By definition, the quality loop is a conceptual model for studying and analyzing the quality of P / W / S by highlighting all the phases (stages) related to the "life" of that P / W / S and the interactions between them.
Figure 1 shows schematically the quality loop model.
The conceptual model of the quality loop has as specific the separate (individual) consideration of the contributions of the different phases of the loop. Also, the order of approach of these phases is correlated with that (order) of the algorithm of conception and development of a P/W/S [5,6].
Thus, the first phase (stage) of the quality loop is "Marketing (Market Research)" - this being a decisive stage for product success.
The reasoning of the decisive importance of this first phase of the quality loop lies mainly in the following 2 aspects:

 A scientific and qualitative marketing and market research ensures a good reception (receive) of the respective product in the market (correct market segmentation including from the point of view of the category of customers to whom P / W / S is addressed).

 It is an important database on the characteristics and technical performance required for the product in terms of "expressed and implied needs" of customers, true judges of product quality.

The second phase of the quality loop "Conception, design and development of P/W/S" has a very important weight in the final quality. This aspect is especially evident in new or modernized P/W/S.

Similar to the medical saying “it is easier to prevent than to treat and cure”, paying due attention to this second phase of the quality loop minimizes the costs caused by possible after-production repairs.

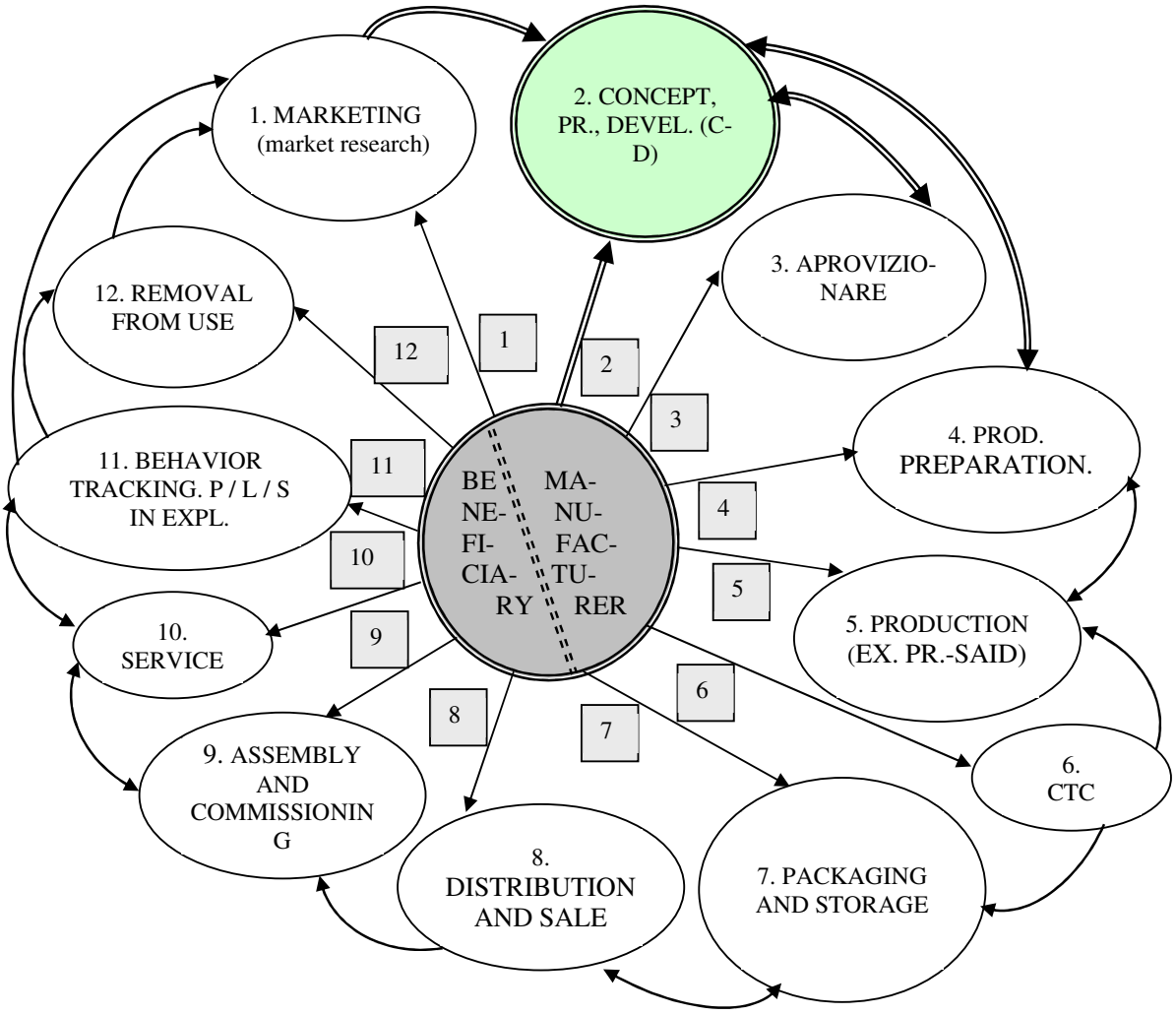

Fig. 1. The conceptual model of the quality loop of a P/W/S

Thus, it is recognized that about 80% of the causes of scrap (defects) arise from design and only about 20% from manufacturing [7].

Like [8] “Joint reporting, collecting and organizing large data volumes (Big Data) in order to automate and streamline the decision-making are possible by means of Business Intelligence (BI) systems. The use of BI enables the construction and implementation of complementary strategies, whose implicitly result is competitive advantages.”

Also, like [9] “Nonconventional technologies have revolutionized a lot of technologies, especially the
mechanical technologies.”
It isn known that [10] “In any industrial enterprise the manufacturing is made according to a technological process. Manufacturing processes have different structures, depending on the manufacturing domain. In a mining enterprise technology of manufacturing process has a particular structure”.
The following are established in the conception and design phase:
 The optimal constructive solution.
 Nature and features of raw materials and necessary materials (including specific consumption).
 The need and features of the equipment, tools, devices and verifiers (SDV) related to the execution.
Another reason that reflects the importance of the design, design and development phase of the product is that one of the most effective methods of quality improvement, namely "Value Analysis" targets precisely this phase (design and design).
In the same context, it is considered that if it is not correctly designed with the product, the quality will not be obtained during manufacture.
Example: The "cartridge" in any drawing of an execution project has several headings, including "Material Type". In the unfortunate event that the material is not chosen correctly (and provided) from the conception and design phase, the manufacture (actual execution) cannot give the P / W / S respectively the prescribed quality.
The importance of the conception and design phase also lies in the fact that the decisions and solutions adopted in this phase can be changed during the execution phase (actual manufacturing) only with the consent of the designer (derogations from the project are required, derogations that must be approved by the designer - for example the change of the material, in the absence of the one provided for the first project).
The main elements characteristic of the 3rd phase of the quality loop (Supply) are presented below:

- Study of the supplier market and its dynamics (any change in the supplier market must be analyzed and interpreted).
- The quality of the contracts consists in providing provisionally and judiciously staggered delivery terms, in direct correlation with the needs of the technological process.
- Selection of raw materials, materials, etc. primarily on qualitative criteria and the optimal quality / price ratio (maximum).

The main feature of the 4th phase of the quality loop, "Manufacturing Preparation" is to ensure the conditions, both in terms of Human Resources and Fixed Assets (Equipment, Aggregates, Tools, Devices) necessary to perform all operations (stages) of technological flow at the prescribed technical and technological parameters.

3. VALUE (PRICE, BENEFITS) – QUALITY CURVE

It is another method of quality analysis. This method is used to analyze the choice of the optimal P/W/S between several different beneficiaries (with different requirements).
For example, let's analyze based on the Value (V) - Quality (C) curve the computerization action (computer equipment) of a company.
In figure 1 we present the scheme of the analysis of the quality of P/W/ S by the Value = f (Quality) curve.
(Ba – Pa) > (Bc – Pc) > (Bb – Pb)
The Price = f (Quality) curve is identical in all three cases a), b), c).
The Benefits = f (Quality) curve is clearly different, which determines a different choice of the optimal P/W/S.
Let's compare the three distinct situations a), b), c).
a) Computerization of the production workshop
Needs:
Inventory of raw materials and materials.
Evidence of workers.
Minimizing waiting times by applying the “critical path” theory”.
Increasing the efficiency of using machines, etc.
To meet these needs, a PC 386 computer is a cover. This type of computer corresponds to a low quality level (Ca has the lowest level) and has a relatively low price, respectively.

Consequently, there is a difference between the benefits (B) and the maximum price (P), ie:
(Ba – Pa) = maximum
b) Computerization of the financial services
Needs:
Large databases.
Operation with specialized software (financial program packages).
Very high working speed to ensure an optimal response time (minimum).
In this case, a PC 386 is insufficient because it has insufficient memory and working speed. Therefore, a PC 486 computer is required.
It is observed that the quality level is significantly higher (Cb> Ca), but the benefit curve being a flatter one (lower level of benefits), there is a difference between benefits (B) and minimum price (P), ie:
(Bb – Pb) = minimum
c) Computerization of the design service
Needs:
Use of specialized and high performance software (eg ACAD).
Operation with very large files (memory).
In this case, a high-performance Pentium computer (eg Pentium IV, V, or higher) is required, which corresponds to both a much higher quality and price level (Cc and Pc are maximum).
Given the new allure of the benefit curve (B), there is an average difference between benefits and price, ie:
(Bc – Pc) = average
In conclusion we can say:
The quality of the components is significantly different in the three cases (Ca <Cb <Cc) and is imposed by different needs (even if it is the same company).
The choice of the optimal product in terms of the Value = f (Quality) curve must be considered by both the buyer and the manufacturer. The reasons (interests) are different, namely:
The buyer does not have to spend money unnecessarily.

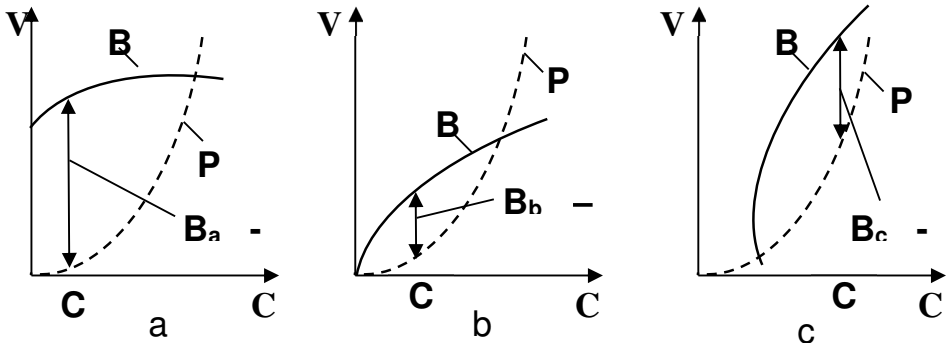

Fig. 2. P / W / S quality analysis scheme by the Value (Price, Benefits) = f (Quality) curve

a) - Computerization of the production workshop; b) – Computerization of the financial services; c) – Computerization of the design service

Pa,b,c – are the Price = f (Quality) curves in the three cases a), b), c).

Ba,b,c – are the Benefits = f (Quality) curves in the three cases a), b), c).

• The manufacturer (producer) must know the dimensions of demand (market segment) for each type of product, for a correct and judicious sizing of the quantitative (assortment) level of production, with all the consequences arising from this (budgetary structure, sizing of output etc.)
• The quality of a P/W/S is given primarily by the market and is quantified by the level of sales of that P/W/S (just before the level of performance provided by P / W / S).

In this context, a P/W/S of very high technicality and performance, if due to the high price it is not sold, consequently has a lower quality than a P / W / S with the same destination and a level of technicality. lower than the first P / W / S but satisfactory for the customer, but which, due to a more convenient price, sells much better.
Assertions are also recognized:
 Not everything that is expensive is implicit and good quality.

 Not everything that is cheap is poor in quality.

Figure 4.6 shows the scheme of the mechanism for establishing the quality of a P/W/S in the market.

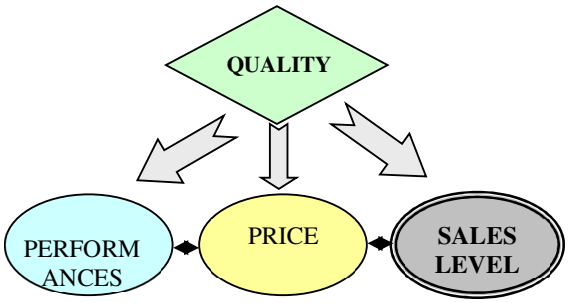

Fig. 3. Schematic representation of quality establishment in the market

Based on this mechanism of formation (establishment) of the quality of a P/W/S in the market, we can conclude that the role of the specific quality indicator represented by the ratio (Price / Quality), which must be minimized (not the role but the value of the indicator).), is taken by the much more complex indicator given by the report

$$\frac{(Price/\ Performance)}{Sales\ level}$$

The equivalence between these two indicators is given by the relationship:

$$(Price / Quality)\ \downarrow \Leftrightarrow \frac{(Price/\ Performance)}{Sales\ level}\ \downarrow\downarrow$$

It should be noted in conclusion that the sales level of a P/L/S quantifies and implicitly and significantly influences the quality that the market establishes for that P/L/S.

4. CONCLUSIONS

Analysis and quantification of the quality of Products / Works / Services (P/W/S) are particularly effective tools for a good production and / or quality manager.

Thus, a good production and quality manager must consider from the conception and design phase the accomplishment of the final product (P / W / S) at a high quality level.

In this sense, the possible "hidden defects" of the product must be avoided, those can often come from these first phases of its fulfilment, conception and design.

Also, the correct choice of materials used is of precise importance. Any derogation from a material provided for in the execution of the design must be made only with the consent of the designer.

Among the methods of analysis and quantification of the quality of P/W/S, the quality loop (spiral) and the Value (Price, Benefits) = f (Quality) curve have a special role and a good efficiency.

The phases (stages) of the quality loop specific to any P/W/S are directly related to its production and consequently all must be given special attention and importance.

Among these phases we note: market research (the production of any P/W/S must have as a starting point a pre-feasibility and feasibility study); conception-design-development; monitoring the behavior of the P /W/S in operation.

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Aspecte privind analiza și cuantificarea calității produselor, lucrărilor și serviciilor (I)

Rezumat: *Articolul argumenteaza importanța unui nou concept în managementul producției, și anume Produse / Lucrări / Servicii. În contextul acestui nou concept, mai cuprinzător decât termenul folosit în literatură, de bunuri și servicii, analiza și cuantificarea calității este deosebit de importantă. Acest articol prezintă două metode de analiză și cuantificare a calității Produselor / Lucrărilor / Serviciilor și anume: bucla calitate (spirală) și curba valoare (preț, beneficii) - calitate. Sunt analizate principalele faze (etape) ale buclei de calitate: studiu de piață; concepție-proiectare-dezvoltare; pregătirea pentru fabricație; urmărirea comportamentului Produselor / Lucrărilor / Serviciilor aflate în funcțiune. Metoda Valoare (Pret, Beneficii) - Calitate este prezentată și analizată în contextul unei acțiuni de informatizare a unei companii. Raționamentul importanței acestei metode se bazează pe principalele nevoi ale unei astfel de acțiuni: utilizarea de software specializat și de înaltă performanță; operare cu fișiere foarte mari (memorie). De asemenea, articolul prezintă, atât analitic, cât și grafic, mecanismul de stabilire a calității în piață.*

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