

QUASI-ACCURATE PRODUCT QUALITY ASSESSMENT METHOD IN INDUSTRIAL DESIGN

Abstract: *The present paper proposes a quasi-accurate quality assessment design method for industrial products, in addition to the measures implemented within an industrial unit, in order to improve product quality. This method is designed by the author and consists of a total of five indicators. Each category of indicators has a number of points related. The total amount of points, obtained by an industrial product, it means its level of competitiveness. The dynamic and complex nature of quality in modern production determined this new approach regarding quality control. This new method analyzes the product in all its complexity provided by the following features: functional, technical, economical, ergonomic, shape, color, style, affordability, degree of obsolescence, pollution.*

Keywords: *industrial design, industrial product, quality control, quasi-accurate method, competitiveness.*

1. INTRODUCTION

Nowadays, product quality is an expression of a nation's economy maturity.

It represents the main concern of decision makers in the economy of an enterprise or of a region, a concern whose purpose is to meet an increasingly evolved and diversified range of consumer society needs and to increase economic efficiency and competitiveness on the retail market.

Increasing the quality of industrial products, of consumer goods, of entertainment, of food products etc. represents the main interest of all developed, industrialised countries.

The complexity of the modern concept of quality leads to a number of varied measures, taken at different levels of the economy.

The constant product quality improvement is an issue which is addressed by both a production unit and by a series of national and multinational organisations, which draw up scientific methods in order to upgrade technological processes and quality control. In developed countries, such as Japan, conferences, scientific sessions and audio-video media programs on the above-mentioned topic are held every year.

Quality control is one of the major factors which determine the quality of products. The dynamic and complex nature of quality in modern production determined a new approach regarding quality control. Accordingly, it does not have a simple, passive, ascertainment role anymore, but an active and creative role by means of a series of operative interventions throughout the manufacturing process, from the early stages of production process programming and design, going through technological equipment purchase, raw material supply and up to product dispatch. In many cases, quality control is also continued in the consumption area and in the warranty period with the help of some special services.

The continuous improvement of product quality is an essential condition in order to meet the needs of a national economy, to increase production, to stimulate

consumption, to raise the living standards and to develop trade, in general.

2. PRINCIPLES OF TECHNICAL QUALITY CONTROL

In the past technical quality control limited itself to the simple sorting of products into good and reject, but nowadays they have active and creative interventions.

The most efficient measures are based on new principles of quality control resulted from an experience of highly industrialized countries. These principles refer to:

- The continuous improvement of product characteristics (efficiency, safety in exploitation, length of service, ease in catering, look, etc.) and not only in obeying the quality norms prescribed at a given moment;
- Placing the emphasis on preventive quality control, from the technical preparation stage of production and study of the beneficiaries demands as well as continuing quality control in the warranty period;
- Emphasizing the attention on technical and technological progress of manufacturing indissolubly linked to quality production.

Organizing quality control in some states in Europe was materialized through the existence of special complex departments, with the role of coordinating all departments of the enterprise to raise the quality of products and their competitiveness.

These departments are structured at the level of the enterprise as shown in Figure 1; also one can notice that to each department a series of specific tasks are given;

3. THE ANALYSIS OF PRODUCT QUALITY CONTROL TO ENSURE COMPETITIVENESS ON THE MARKET

3.1 Competitiveness nation

Competitiveness in the production field is the basis for competitiveness of an entire nation. Investment is the tool to replace worn machines, the weakly productive with new better ones, also they are the levers to integrate

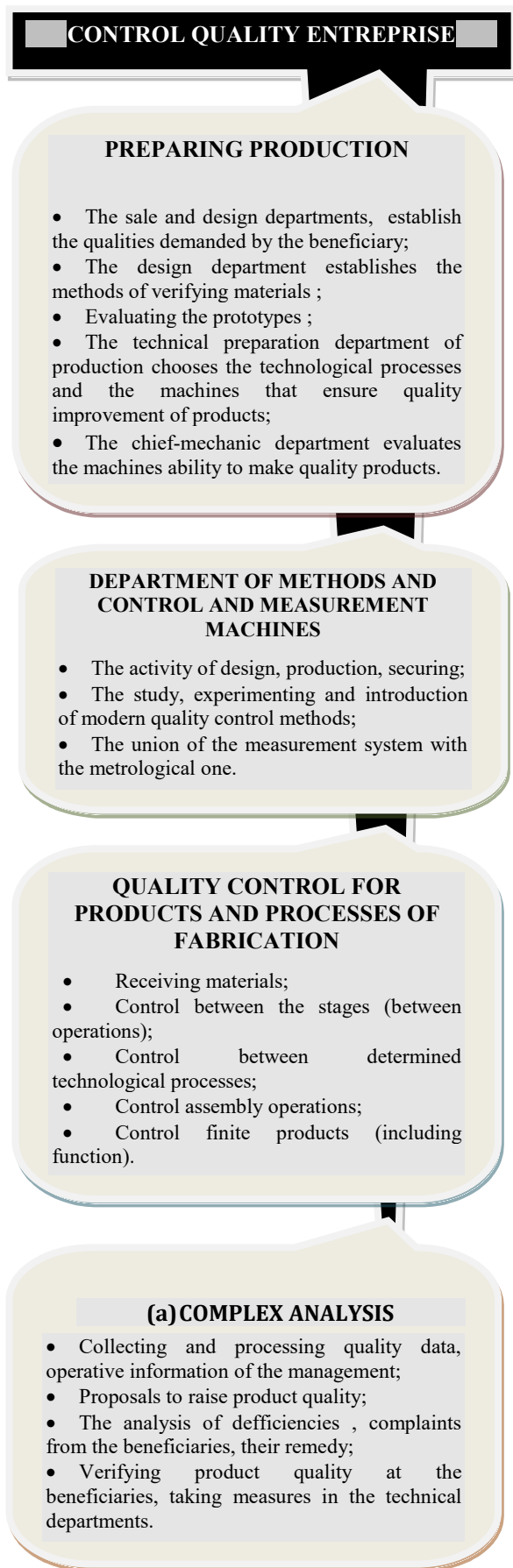


Fig. 1 The structure of quality control departments at the level of the enterprise.

the most modern technologies.

It is important to emphasize the complexity of factors that bring about competitiveness:

- The state that has to use in an intelligent manner the fiscal and social taxes;
- The workers who have considerable influence on the level of production;
- The managers who decide upon investment and manage production factors

The basic scheme of national competitiveness has the structure according to Figure 2 below.

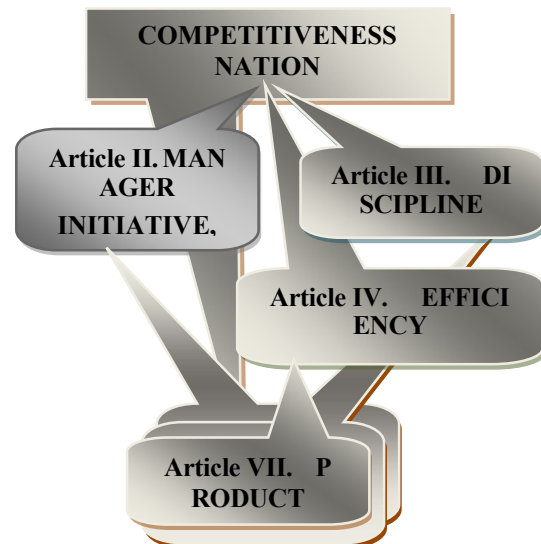


Fig. 2 The structure of national competitiveness.

High tech products play an essential role in international competitiveness due to two main reasons:

- The state that has to use in an intelligent manner the fiscal and social taxes;
- The workers who have considerable influence on the level of production;
- The countries that have high technology have considerable industrial potential thus through the massive export of technology or latest products record a significant economical raise;
- Top industries have the quality to be strategic and structured, acting as propellers for economic growth.

Top technologies are becoming more and more important in the economical calculations of the manager compared to the cheap work force. In top industries individual characteristics of products, their quality and innovation, are essential. One can see that the advantages in the costs planning are generated largely by the know-how phenomenon and by the advanced technologies more than the cost of factors.

Nowadays a new conception of technological advancement detaches itself, having the mission to overcome traditional limits, to promote mechanisms of implementing technical progress, to adapt to the socio-economic and cultural characteristics of the environment where science and technology are real economical phenomena.

It is recommended to get good quality for each product, a distinct entity in the ensemble where it

functions, through a competent strategy, imposed at a managerial level.

In this paper the dependence of the activity of a certain product is emphasized by the most important causal factor, that is its quality.

3.2 Two stages in the evidence and analysis of product quality and competitiveness on the market

One proposes, in this paper, that the analysis to ensure competitiveness on its market to be done successively in two stages: I and II, and in the order indicated below:

- In the first stage - I: at the level of production section, department of quality control, manager;
- In the second stage - II: marketing department, industrial design, manager.

The second stage is the final and most important, it is indicated after completing the first stage because the requirements and criteria for checking the products are more comprehensive.

These criteria allow for a complex analysis of the products in all stages of their life and obtaining some realistic results.

Thus, in the first stage creating the evidence of product quality control is imposed because of the need to apply elimination measures to the generating causes of flaws and for their bringing to the knowledge of the manager.

The systems of organizing the evidence of quality control results can be of various types as follows:

- Evidence done by controllers at the work place, for flaws in quality and for the products that were returned to be redone by indicating those responsible;
- Evidence of quality of flaws and operations, done by the technical quality control department by indicating the guilty party ;
- Evidence of internal and foreign complaints, and the rejects the cost of disturbance ; by mentioning
- Evidence centered on the results of quality control by taking the measures regarding the supplying, receiving of the raw materials in the field of production, wrapping, storage, etc, the evidence of deviations from the established norms communicated to the management for some interventions;
- The computerized processing of data and making diagrams of rejects;
- Collection of samples of products of different periods to verify the establishment of some parameters of product quality to compare on an international level.

The analysis of product quality is vital to establish their competitiveness, of the success on the market, it is based on specific indicators such as:

- The quality value (the rapport between the total percentage of flaws and the normal admitted one);
- Losses connected to rejects and disturbance;
- The amount of top quality products from the total production obtained;
- Number of complaints;
- Specific indicators (duration of service, weight, maintainability, etc) under the form of all outs per hour,

at 100 or 1000 hours of functioning, average time of service without fall outs etc.

In the second stage product quality is established and implicitly the competitiveness, on the basis of specific indicators with a certain number of points.

3.3 Quasi-accurate, original method of evaluation of product competitiveness applicable in the second stage, in the industrial design

The interdisciplinary character of industrial design imposes creating a team of experts to act efficiently in the field of expertise of product competitiveness.

The complexity of the factors included in the design and sale of a product leads to a correlated activity of a bigger number of scientific fields; marketing, research, manufacturing, logistics (handling, storage), design, aesthetics etc. All these presuppose an ample deployment and correlation of different specialties.

In the present conditions, the production enterprise has to understand that it does not sell only the product itself, but with it a volume of information in the sphere of industrial design, that is to put into practice the value of usage of the product, as it was foreseen even from the state of research-design.

At the level of the enterprise there must be an adequate organization environment.

The management needs specialists “experts” to help in decision making, who have ample knowledge and experience in modern technological problems, the problems of the market; the reasons that determine the buying of products, to suggest new directions for the development and expansion of manufacturing and delivery.

A specialist to satisfy these fields is actually very rare, thus the solution to all these problems is recommended to be performed in groups of specialists directly subordinated to management.

The original chart presented in conformity to Figure 3 [1] has all the quality indicators which can be considered by specialists in industrial design when they develop studies to evaluate a certain product, to establish its competitiveness.

The notes in Figure 3 have the following meanings:

- A – Product competitiveness;
 - B – Product quality.
- The author conceives the system of indicators of industrial products quality classified into five categories:
- C1 – social and economical indicators with a number of sub-indicators:
 - financial availability;
 - degree of pollution;
 - wear and tear.
 - C2 – indicators of form, color and style:
 - the aesthetic principles as: the proportion, the balance of composition etc; [2]
 - decorations.
 - C3 – technical economical indicators:
 - reliability;
 - endurance, maintainability;
 - cost.
 - C4 – ergonomically indicators:

- environment (lighting, temperature, airing, humidity, noise, color);
- psychological environment;
- rest;
- duration of work (position while working);
- clothing.
- C5 – indicators of presentation in commercial activity:
 - wrapping;
 - display of merchandise;
 - publicity and commercial advertisement;
 - transport.

The respective points to the above indicators are the following: C1 – 15 maximum points; C2 – 15 maximum points; C3 – 40 maximum points; C4 – 15 maximum points; C5 – 15 maximum points

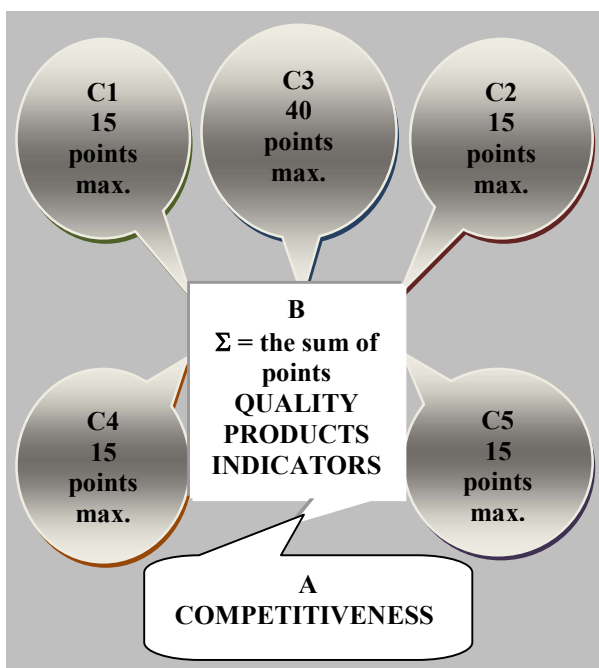


Fig. 3 The chart of quality and competitiveness indicators.

The specialists, in evaluating quality, must distribute the maximum number of points, from each category, on the corresponding sub-indicators of a certain product.

It is understood that this algorithm is a general one and it is necessary to correspondingly adapt to the evaluated product. Each type of product is analyzed in conformity to a special algorithm, especially conceived.

To this end, it must be understood that the sub-indicators can differ from one product to the other; but the number of points on the categories is constant. In total, a product can accumulate a maximum of 100 points.

In Figure 3 the four classes of competitiveness were designed and presented below:

- between (100 – 85) points - the product has very good competitiveness (quality);
- between (85 – 75) points the product has good competitiveness (quality);
- between (75 – 50) points the product has satisfying competitiveness (quality);
- under 50 points the product has weak competitiveness (quality).

This evaluation of quality, corresponding to the second stage, finally determines the real degree of competitiveness of the product.

If the product is weak, by accumulating a number of points smaller than fifty, the specialists recommend, by a just memorandum, its removal from the manufacturing and redesign process.

If after the expertise one gets a satisfactory product, one also makes these kind of precise recommendations, only for certain activities not as good.

The expertise of competitiveness of products is recommended periodically, according to a schedule that is in conformity with the profit rate.

A product, with a very good competitiveness, ensures profit on the internal market as well as the external market.

4. CONCLUSION

The originality of the paper lies in the proposal to make the evaluation of competitiveness of industrial products with a new, very complex, quasi-accurate method.

This method was possible to conceive only through knowledge and understanding of the importance of industrial design theories insertion in modern design.

The profit recorded by a producing unit is also a measure of product competitiveness that, launched on the market was sold in the shortest time possible. Product competitiveness is the main factor at the basis of establishing long-term development strategies of a production unit.

In most Romanian enterprises, quality is determined only in the context of the first stage. The structure of quality control departments at the level of the enterprise does not analyze the industrial product in all its complexity provided by the following features: functional, technical, economical, ergonomic, shape, color, style, affordability, degree of obsolescence, pollution.

This method can be successfully implemented in the department's work methods of measurement and control of the products, but and in complex analysis department.

To obtain accurate results, we recommend reviewing two similar products, but in different generations.

REFERENCES

- [1] Tocariu, L., (2001). *Estetica industrială-teorie si practica*, Ed. Evrika, ISBN 973-8052-95-5, Braila.
- [2] Tocariu, L., (2014). *Design industrial*, Ed. University Press, ISBN 978-606-696-019-9, Galati.

Author:

Assoc. Prof. PhD. Liliana TOCARIU, University "Dunarea de Jos" of Galati, Faculty of Engineering, Mechanical Engineering Department, E-mail: ltocariu@yahoo.ro, Liliana.Tocariu@ugal.ro, Phone: 0744487138.