

QUALITY: BETWEEN PHILOSOPHY AND POWER SYSTEMS

Jakość: Pomiędzy Filozofią a Systemem Elektroenergetycznym

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Abstract: The "quality" was the one of the category listed by Aristotle in the *Organon*, and becomes the second category in the Kant's philosophical treatise. But it is at the beginning of the XIX Century in the well-off bourgeoisie of Paris that Gioacchino Rossini in his Opera "*Il Barbiere di Siviglia*" (The Sevilla's Barber) makes his Figaro to sing "*Sono un barbiere di qualità*" (I am a barber of quality). Quality becomes the fundamental element to characterize a person, an attitude, a philosophy of life, a product, a market. Starting from the philosophy concept of quality, the paper traces a cultural course about the concept of "quality" and its application to the field of technology and to the electric power systems.

Streszczenie: Pojęcie "jakości" pojawia się już jako jedna z kategorii wymienionych przez Arystotelesa w jego dziele "Organon", a także zostaje umieszczone jako druga kategoria w traktacie filozoficznym Kanta. Ale to dopiero na początku XIX wieku w bogatej burżuazji Paryża Gioacchino Rossini w operze "*Il Barbiere di Siviglia*" (Cyrulik sewilski) każe śpiewać swemu głównemu bohaterowi Figaro arie "*Sono un barbiere di qualità*" (Jestem cyrulikiem jakości). Jakość staje się podstawowym elementem charakteryzującym osobę, postawę, filozofię życia, produkt czy rynek. W referacie nakreślono drogę zmian kulturowych jaką przeszło pojęcie jakości, od filozofii do zastosowań jakości w obszarze technologii i systemów elektroenergetycznych.

Keywords: quality, power systems, electricity market

Słowa kluczowe: jakość, system elektroenergetyczny, rynek energii elektrycznej

1. INTRODUCTION

The attention for the "quality" in different aspects of the life from the supermarket products to the technical field is a widespread characteristic of the well-developed countries.

Once the primary needs of "quantity" are satisfied, the attention to the "quality" rises up and becomes a goal. "Quality is number one", this sentence was launched two years ago from a well-known car industry in USA, for advertising a new car model.

In the present changing moments for the economy, the defense of consumers and the preservation of the environment combined with the technology evolution and the market dynamics give rise to a contest in which the "factor quality" assumes a central role in the strategy of industries, companies, National and International organizations.

The concept of "quality" has been defined on the technical point of view in the International Standard ISO 9000 [1] that define the quality as "*The totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs*".

In practice, the quality is the capacity of the enterprises to provide products and services in line with the clear and im-

plicit expectations of consumers and users that constitute the market of reference.

In the present paper, the Authors try to run along a road that pass through the philosophy and arrive to the affirmation of the concept of "quality" in the domain of the technical world and in particular of the electrical energy one. After a brief summary on the importance of the "quality" in the brightest minds of the history of the philosophy, the paper highlights how the electric power quality can be framed in this topic with the relevant problems and solutions. Problems and solutions that can be found in the application of quality criteria to our life, too. For this reason, during the treatment of this topic a nice parallel—with the resource of irony—is made with the famous Opera "*Il Barbiere di Siviglia*" (The Sevilla's Barber) that represents the hymn to the "quality" in both music and words.

2. QUALITY UNDERLYING PHILOSOPHY

The definition of quality represents a fascinating topic and since the antiquity it was dealt and discussed by philosophers, scholars and thinkers.

That is the numerical and the geometrical shapes. The physicist separates from all the qualities that are not reduced to the *movement*, to consider only the being in movement. In the same way, the philosophy must proceed. It must reduce the multiple means of the words to obtain a sole and fundamental meaning, it must consider “*to be*”, neither like quantity nor like movement, but just and only like “*to be*”.

- *John Locke* (1632–1704) distinguished between primary qualities, objectively necessary to the same existence of the things and secondary qualities that are the subjective ones.
- *Gottfried Wilhelm Leibniz* (1646–1716) turns over the modern quantitative perspective or, better, he finds it on qualitative basements. The quality concept is filtered from whichever residual quantitative. There is not a quality in an object or a greater or smaller presence of a specific quality inside an object; on the contrary, the qualities are applied and/or identify themselves with the procedures. Therefore, as an example, the extension or the continuity do not belong to some objects, but they are identified with the procedures of the extension and the continuity, respectively.
- *Immanuel Kant* (1724–1804) in his treatise “*Criticism of the pure reason*” [2] considered the quality one of the four deductive form of the reason. They are : *quantity*, that is unity, plurality and totality; *quality*, that is truth, negation and limitation; *relation*, that is causality and interaction, and *modality*, that is possibility and impossibility, existence and not existence, and necessity.

Recently the problem of the quality has been set up like a comparison between the perceived truth and its present ideal representation in the examining subject. Quality is the whole of reality. Dynamic Quality is the open, changing, promoting aspect. Static quality is the continuous, stabilizing aspect. Ontologically, the interaction between the two is Evolution. Epistemically, the interaction between the two is Perception. Both perception and evolution are quality events, determining what is and becomes of our world.

Quality could therefore be the set of elements that determine the way to be of something, as an example a product. Systems of certification seems to confirm this thesis: the homologation to a series of standards concurs the attribution of a certificate of total quality, assigned not to the single end-product, but to the entire productive cycle, and that means to the „thought” that governs all the actions inherent to it. The nowadays obsession of the industrialized world is therefore the quality: in factory, hospital, local agencies, mail, service, school, etc.

To such purpose, someone says that the quality is a characteristic of the industrialize Countries, introduced in our life by the Japanese way of work or by the American style of life : it is not true. It was a barber, was from Seville. He was mad about quality. He sang „I am a barber of quality...” (Fig.1).

Gioacchino Rossini (1792-1868) composed the music of *Il Barbiere di Siviglia* (The Sevilla’s Barber)—on the libretto of *Cesare Stermini* after the play of *Beaumarchais*—in the period of which he lived in the well-off bourgeoisie of Paris. The research of the “quality of life” in one of the richest cultural environment at that time is reflected in many of his semiserious operas and operas buffa, but it is in the *Barbiere di Siviglia* [3] that Rossini overtakes the hymn of the quality.

The entire Opera “*Il Barbiere di Siviglia*” in the words and in the music is a representation of the “quality” endowing it with great physical reality through a subtle interplay of rhythmic and sonic contrasts between the orchestra, the voices and the action. The actors and the situations can be transferred in a nice parallel—with the resource of irony- to the actors and the problems associated to the quality in the technical areas as well as in the everyday life [4].

Figaro, the barber, is the quality maker, the one that observe and monitors the reality around him and control the events to assure the “quality” in the ideal market that is the Sevilla’s square. But, as in every field, and in the technical domain in particular, the quality has a cost. And the ideas of Figaro become brighter and brighter as the price goes up: “all’idea di quel metallo portentoso (l’oro) onnipossente, un vulcano la mia mente incomincia a diventar” (“thinking to this powerful and prodigious metal (the gold) my mind is becoming a volcano”). He also is able to keep under control “resonance” effects as when he arrive to avoid the damages that the “calumny” (described as a nice and thin air that start as a light wind and becomes at the end a cannonade as a thunderstorm) can bring in the story of the play. Also the orchestra follows a wave of crescendo and a rhythm control dominated and regulated on the barber actions and music score, with an extraordinary skill and great attention to the quality of the sound.

In the opera, both in the story and in the music a recurrent theme is the competition, that is a primary actor in the research of quality. In fact, in a free society and a free market, the competition is very high and more often the quality becomes the choice factor, the key of success. A process that brings to the definition of Standards of quality.

3. STANDARDS OF QUALITY AND CERTIFICATION

The industries, the commercial activities, the organizations and every enterprise in general, they respect a series of their own rules, that means they adopt a kind of intrinsic quality, necessary for existing in the competitive market.

Today, the actual problem is to pass from an “empiric and not certified” quality to a real quality system documented on a standard basis following the criteria contained in the group of Standards ISO 9000 [1,5,6,7].

The following steps have to be developed:

- knowledge of all the Standard recommendations (way and procedures for the management and the control of the supply, of the productive process, etc.);
- application to the every day activity of the Standard prescriptions fitted to the particular reality of the enterprise;
- documentation by means of suitable forms (quality manuals, procedures, instructions) of the recommendation respect;
- eventual notification by a Certifying Authority.

The goal of the Standards ISO from the 9000 to the 9004 included, is the control of the process that generates the product or the service and not, as sometimes erroneously it is considered, the control of the quality of the product or of the service.



Fig. 1. Costume of Figaro, the Sevilla's barber, preserved at the Library of Opera Theatre in Paris (France).

The *quality certification* must not be confused with the *conformity certification* of a product, that guarantees that the product corresponds to the scheduled use and do not give rise to damages. It is a quality in the system, in the action and not focused on the results.

The Certification of Quality System derives from the will of the enterprise to let an Institute or an Authority to "judge" all the control activity of the production process, and to indicate in documents (manual, procedures, instructions) the correspondence to the relevant standards taken as reference and applied to the process operation.

The Certifying Institution verifies the correct application of the standard procedures and keeps during the time a control on the enterprise, with the possibility to annul the certi-

fication when differences and anomalies can be found in the way that they can compromise the quality guaranty.

The European policy on the standards and certifications in the last decade has been the motor of the qualitative growing of the European companies that have enlarged their commercial markets passing from the National to the International ones.

The European Union has two main goals on this topic:

- to create a large common market of 350 million of people in which the free circulation of the products is guarantee, included the electric energy;
- to increase the quality level of the European enterprises through a diffusion of the culture of quality by means of the application of the Standards ISO 9000 for competing with success in the International markets as USA, Japan, Far East.

4. THE POWER QUALITY IN THE ELECTRIC MARKET

In the electric market of the industrialized countries, even under different rules and strategies, the power delivery companies play a key role in the quality of the supply, even if this latter is also affected by other actors as the user's operating conditions, the apparatus, the customer's industrial plants and the limits set by the Standard Authorities.

Fig. 2 summarizes the power quality (PQ) management process in an electric distribution company. The main role is represented by the monitoring activity (a) [8], which consists in the collection of data taken from the network (g) and from the users (f). In this field, continuous monitoring, fast data acquisition, adaptable and on line data control can play a fundamental role for limit the disturbances on customer's operation.

The information assumed by the monitoring gives origin to the state variables (b), because they describe the complete system "network-users". When the quality is not satisfied, some possible actions are scheduled (e).

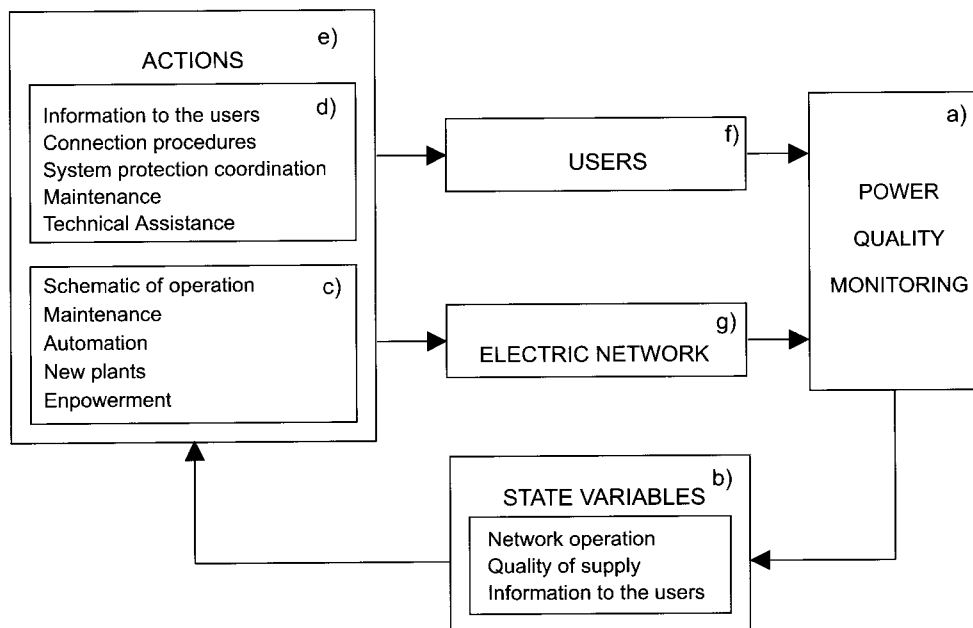


Fig. 2. Power Quality management.

The possible weight of the different actions is set mainly depending on the distribution company business program.

In the block (e) the different actions are structured in two parts: block (d) concerns solutions on the customer's side; while block (c) is relevant to the distribution network. The actions described in (d) are defined in the supply contracts or are on charge of the customers. Interesting aspects of power quality in contracts between users and power delivery companies can be found in [9]. Instead, the distribution company usually establishes a working program on the line of the solutions reported in (c).

The list (c) is ordered on the basis of the value of the costs/advantages ratio, starting from the lowest one (the less expensive and more rapid procedure) to the highest.

The choice of the action to be assumed is associated to the value of some parameters taken as PQ indices [10].

In particular, the installation of compensating devices by the distribution company, for increasing the quality level of feeders supplying sensitive loads, represents the more interesting solution on the point of view of the research development.

If the PQ problems are related to short-interruptions and/or voltage sags, some devices mainly based on power electronic components, and so called "Custom Power Technology" [11], can be adopted by the distribution company.

If the PQ problems are due to harmonic or interharmonic components in the industrial system currents and voltages, the compensation devices that can be inserted in the network to reduce the disturbances, are passive or active filters [12,13].

The active compensation is a relatively new technology, practically less than one decade old. Therefore, a number of features, considered as drawbacks, such as their cost, limited power rating or complexity will disappear with the progress in their technology and with change from the development to a mass production.

In the absence of penalties due to the breach of Standard limits on harmonic pollution, the convenience of the filtering action is only related to the estimate of the damages associated to the disturbances, in terms both of industrial plant components and production losses.

5. CONCLUSIONS

The paper highlights how the concept of quality progressively entered in the development of the technological world giving relevance and strong application to the assumptions and the theories of famous philosophers and thinkers of the past.

"Quality" today is becoming the main parameter to select choices on products, services, processes. Soon, also in the domain of the electric market the quality will reach the role of important factor of decision and rules for contracts and price estimation. The competitiveness of the markets brings to an evaluation of the quality in term of economy and customer satisfaction. But the research of quality on the philosophy point of view is a critical reflection on the different form of the human knowledge, is a new and strong incentive to project and brings to a general empowerment that include all the different activities of the life.

We can end with the words of *Parmenides*: "the philosophy route does not move far from the human walk but in the same path, the one we run all together".

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