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**CONSIDERATION ABOUT QUALITY RELATED
PROCESSES AND MILITARY SYSTEMS**

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Abstract:

When you state that the military was a pillar of human society along the history, you will definitely find enough interlocutors from civil society that will lenient approve you. But when you stand that the military systems have had a very significant contribution in the development of human civilization, you may assume the risk to receive a chorus of whistles from the audience. In a very short overview, considering the immensity of domain to which is related this excerpt, I consider that, as far as quality processes concerned, military have played a significant role in establishment and development of one of the most important engine of increasing the level of comfort for entire society

Keywords: quality, standards, processes, military

1. Introduction

Nowadays we have to face the daily challenge of living in an unpredictable and complex world who expanding in every second. Law which govern the global economical society can still be reduced to demand and supply market, leading to supplier / consumer duality.

On one hand, from the supplier's point of view, the present economic downturn has maybe reduced a company's business, but it has not decreased the requirements related with doing business. Taking into consideration the fact that IT became the core of almost all human activity, the previous statement is particularly true for the numerous activities associated with technical data interpretation and application. For example, even though the quantity of components to be produced may be significantly less than in the near past, everything linked with the technical data box up has still to be addressed.

On the other hand, from the consumer's point of view, new technologies, new devices and a large scale of products are flooding the market despite of financial crisis. In order to live in our world we need to use some of them. For sure anyone, starting from an individual consumer to the largest corporation, cannot afford to buy every product available on the market. So, we have to make choices.

And now it raises one question: *How many choices do we make?*

According to one study, the average human makes about 612 decisions a day. This equals to 4,900 decisions in a week and 254,800 in a year^[1]. Another study suggests that the average person makes thousands upon thousands of decisions each day both involuntary and voluntary. Involuntary are those in which your brain sends messages to your body to follow through on and voluntary decisions are those you actually debate to choose. From a psychological perspective, it is necessary to examine voluntary individual

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decisions in the context of a set of needs, preferences an individual has and values they seek^[2].

In respect with this, a very useful tool in decision making process is something that can be defines as "the totality of features and characteristics of a product or service that bears its ability to satisfy stated or implied needs.^[3]". But this is in fact a definition of quality.

2. Instead of definition

"Quality is not an act, it is a habit." – Aristotle

The term comes from Latin, the word "Qualis" which can be translated by the phrase "way of being". You can find a lot of definitions, starting with short one: "Quality is doing the right things right and is uniquely defined by each individual"^[4] and continuing with a realistic one "Quality is a really, really boring definition that has no real meaning to most humans on this planet unless you are a millionaire consultant writing a new book or a quality coordinator applying for some "Quality" award or certification so you can quit and become a millionaire consultant who writes books and produces infomercials from his private island in the Caribbean"^[4].

Quality indicates the degree to which product characteristics meet the needs of the beneficiary, the measure to which the product meets a particular service or comply with a particular mission. Quality is a measure of the value in use. If the using values differentiate products according to the utility they satisfy, the quality differentiated products of the same type by the number of useful properties they hold, and by the degree of correspondence in the field in which it is used. Quality presents a dynamic facet, because its content is evolving in step with practical necessities. This fact reveals a less discussed aspect of the concept of quality – dependence from the temporal dimension. Due to the dynamic changes in the contemporary environment, products and services are demanded for rapidly changing. A product that is still on the designer board, until put it in production, it is possible to be already overcome.

3. From Stone Age to nowadays

But concerns about quality are not an attribute of contemporary world. Maybe the oldest evidence of quality control is from the excavation of a mine (dated in Stone Age) for producing flints in Scandinavia (from around 3500 BC) used in the manufacturing of Viking boats. The excavation relieved unnecessary parts - finished tools unwanted at the mine (internal failure costs) and thrown out before to be purchased by travelling merchants. The motivation for rejection was to stop unsuitable flints to be transported to Sweden, just to be rejected at point of use (external failure costs). This is an early example of a method to reduce the cost of non-quality.

Historians have indicated the concept of quality far rear around 1780 B.C. also in Babylonia. In the code of Hammurabi, ruler of Babylonia, we can find the following statement: "The mason who builds a house which falls down and kills the inhabitant shall be put to death"^[5].

In China, quality control for handiwork industries progressed during the Shang Dynasty (16th - 11th century BC). The handicrafts involved included bamboo, wood-working, metallurgy and textile industries. The process of quality control was exercised by a branch of labor. At the same time and going into the Zhou dynasty (11th - 8th century BC), a standardized system of measuring equipment was laid down. This included a twice

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yearly calibration by the state using an official organization, parallels current trading standards/accredited calibration laboratories. Typical specifications included: “utensils under standard are not to be sold on the market”.^[6]

In the Middle Ages, in Venice, rudimentary production control and standardization was introduced in the shipbuilding.

In the middle of the eighteenth century, in France, Honoré Le Blanc developed a kind of quality guide related to interchangeable components of the same kind of products. The idea was exported by Benjamin Franklin, at that time Ambassador to France, in USA to Eli Whitney who had a significant role in promotion and popularizing of the idea of interchangeable parts. Next, during the Industrial Revolution and the consequential factory system, the concept of quality and the way in which process were controlled started to have some of the features that we know today.

At the beginning of 20th century Frederick Winslow Taylor, an American mechanical engineer developed a philosophy known as “Scientific Management”. Later on, in 1924, Walter Shewhart introduced “Statistical Quality Control” and plan-do-study-act (PDSA) which was the first time when cycles were used for increasing quality.

After Second World War, William Edwards Deming, who was a census in occupied Japan “taught that by adopting appropriate principles of management, organizations can increase quality and simultaneously reduce costs (by reducing waste, rework, staff attrition and litigation while increasing customer loyalty). The key is to practice continual improvement and think of manufacturing as a system, not as bits and pieces.”^[7] He is also considered the founding father of the cycle Plan – Do – Check – Act.

In the 1950s, after long academics debates concept of ‘Quality Assurance’ went forward and his development had gained increasing influence, covering ‘Quality Control’ concept. Almost in the same time, Joseph Juran developed ‘Cost of Quality’ approach.

During the 1960s, Philip Crosby introduced the concept of “Zero-defects”, who was centered on the idea of realization of employee motivation and awareness. In the 1970s quality assurance / control principles covered not only the manufacturing world but also penetrated the services area. In the late of 70s, a spectacular shift of quality assurance approach was happened from a reactive approach – based on inspection of the product to pro – active approach based on preventing defects.

In the 1980s to the 1990s, quality control and management went to Total Quality Management (TQM) concept. This philosophy can be summarized as “customer focus, the involvement of all employees, continuous improvement and the integration of quality management into the total organization as a result of the creative involvement of all stakeholders”^[8].

In the same time, in 1994 “British Standards 5750” was adopted as ISO 9000 International Standards of Quality series (revised in 2000 and 2008).

4. Military and Quality Processes

Military system has had an essential role in developing quality philosophy. Due to the specific materials necessary to carry out military activities, concern for high quality products supplied has been the center of attention of military organizations wherever the world.

Starting with the early times, military played a role in establishing quality standards. As early as 1450 B.C. the Egyptians made use of a form of inspection and measurements for swords.

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Honoré Le Blanc, the father of interchangeable parts, mass production innovator, was a French gunsmith and he developed a quality guide for musket manufacture and interchangeability focused on artillery field. Again, Eli Whitney had a contract to produce 10,000 muskets which had to have interchangeable parts. Because of problems related to the new requirements and mass production technology that concerned special machining and comparison of each piece with a standard, it took nearly ten years instead of two years to deliver entire quantity (also because the military inspectors were implied in acceptance of the muskets).

Before the Second World War, all materials supplied by military were inspected 100% to assure quality. During the war, because of the large quantity of material needed to be procured for the war effort, it became too costly and almost impossible to continue this method and thus turn out to be necessary to introduce a method to shorten the time allotted to inspection but, at the same time, to ensure a high rate of confidence in product quality.

The solution was to use sampling methods, theory that was developed by Walter Shewhart but his ideas attracted little enthusiasm at the moment when was delivered. For entire industrial environments it was necessary that the United States Army to introduce this method in 1942 in order to understand the importance and efficiency of sampling charts or “Statistical Quality Control” in manufacturing. By the end of the war, all services of the U.S. military have developed similar plans and used them during acquisition processes. After the Second World War, with the emergence of the Cold War, weapons systems have become increasingly sophisticated. As a reaction, US Department of Defense issued three military standards for inspection sampling. It was the beginning of a long series of Military Quality Standards (MIL-QSTD), and in 1963 one of these documents turned out to be an ABCA (America, Britain, Canada, and Australia) Standard. So quality standards began to have an international level. But these standards were not enough.

Former President of United States, D. Eisenhower said in his last political speech that in US was created a permanent armaments industry of vast proportions. Related to this, 3.5 million men and women were directly engaged in the defense system. This combination of a huge military machine developed an arms industry was a new experience in American life. It was created a huge "military industrial complex". In order to keep under control this “monster”, Government inspectors from Air Force asked first that requirements for a contractor quality program to be issued. These requirements were intended at major contractors appointed in the development, production and selected service commissions for aircraft and missile systems. Using the Air Force example, the other Services set off similar requirements for their products of comparable complexity. In the late 1950s the responsible acquisitions staff brought all parties together to create a harmonized approach on quality. These organizations developed and issued Military Specification MIL-Q-9858, Quality Program Requirements. So was born the document that will decisively influence how the quality assurance will be done for a long period of time related to acquisitions of products and services for US DoD which was signed on 9th April 1959. It established what contractors had to do in order to achieve conformance. The development of quality standards reflected the need to transfer the burden of work from inspection by Government inspectors to “quality assurance” guaranteed by the contractor. By 1962 the NASA had also developed its “quality system requirements” for contractors, based on MIL-Q-9858. But the area of influence of this basic standard went far away. In 1979 it was released British Standard BS-5750 were you can find a great degree of commonality with MIL-Q-9858 (which meantime was revised as MIL-Q-9858.A in

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December 16 1963). And I want to remind the fact that BS-5750 was adopted in 1994 as ISO 9000 standard.

In 1968, in order to spread on the entire organization the same procedures among partners, NATO has established a frame of standardized procedures (AQAP series) linked by STANAG 4107 in an attempt to support quality assurance in acquisition activities. AQAPs series were revised in 1993, 2003 and 2009.

5. Conclusions

Quality assurance and control processes are one of the most dynamic growth engines of the production of goods and services, being a pillar of the development of human society.

Quality, like beauty, can be defined in different ways. It is an intrinsic attribute of a product or service that evolves over time (and not necessarily downwards, for example some drinks become tastier in time).

During the time quality assurance and control processes has been a constant presence and it was in a close correlation with the level of civilization of the society.

Since ancient times the military system was linked to the quality assurance and control processes, most often being in a position to shape the concepts and philosophies on quality. Also, the military has pioneered the spread and acceptance of international level of common quality standards.

References:

- 1 www.ahpproject.com
- 2 http://www.ask.com/wiki/Decision_making
- 3 ISO 8402-1986
- 4 <http://web2.concordia.ca/Quality/definitions.html>
- 5 <http://eawc.evansville.edu/anthology/hammurabi.htm>
- 6 <http://www.thecqi.org/Knowledge-Hub/Knowledge-portal/Concepts-of-quality/History-and-tradition/History-and-tradition-in-depth/>
- 7 <http://www.dharma-haven.org/five-havens/deming.htm>
- 8 <http://www.bpir.com/total-quality-management-bpir.com/menu-id-71.html>