

# Quality estimation methods used in product life cycle

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## Industrial management and organisation

### ABSTRACT

**Purpose:** A new approach to quality control in production company with usage of quality research methods has been presented.

**Design/methodology/approach:** The possibility of usage of quality research methods are connected with continuous quality improvement of pre-production, production and after-production spheres of organization. Interdependence of the quality research methods and product life cycle has been taken into account.

**Findings:** At the present time the enterprises should integrate quality management and quality control with product life cycle, quality methods, the factors forming quality products requirements. Such kind of strategy will enable to achieve success for these companies.

**Research limitations/implications:** Described quality methods can be employed in companies in the whole product life cycle.

**Practical implications:** Model of quality research and estimation methods based on product life cycle can be used in companies for continuous quality improvement. Usage of this model can improve functionality of all process in company and reduce spoilage and cost.

**Originality/value:** Model of quality research and estimation methods based on product life cycle method has been presented. This model is a propose of new strategy of effectivities and efficiencies activities of preproduction, production, after-production sphere.

**Keywords:** Quality management; Quality research methods; Product life cycle

## 1. Introduction

Every final product is made in the consequence of realization of production process. This manufacturing process is a result of conversion of raw materials, materials, semi-finished products into final product, which it is marketable offer a producer [1,2]. However around competition on market cause, that organizations both look for ways of assurance of high product quality and also the lowering of production cost, as well as settlement of every process in company. So the key to success very often analysis of production process of organization based on quality [3,4].

It seems that quality control of produced articles in the whole cycle of its existence is absolute necessity. This is result of synergetic influence of many factors, and in this: possibility of profit enlargement, possibility of decrease the quantity of defects and spoilages, consolidation of position on market, improvement of organization image [5].

In this paper selected problems, connected with quality monitoring and quality control using quality estimation method in whole life cycle of final product have been presented.

Also the model of quality research and estimation method based on product life cycle possible to used in Polish companies have been given.

## 2. Product life cycle based on quality criterion

Fulfillment of customer's requirements is closely connected with delivering them the products of the highest quality. In order to preserve and increase quality level of products, the producers should take measure this quality, control it and try to improve it. Such activities should take place on every stage of existence of the product and technology; from the moment of market researches and projecting, and until its removal market [1, 6]. The correct quality control, which makes it possible to create satisfying products for customers, has take into account many factors. These factors were shown schematically on figure 1 [7]. The synergetic influence of presented factors shapes the final level of product quality. However this influence is not equal on every stage of product life cycle. Depending on considered phase of product life cycle or technology life cycle the different factors have dominant impact on quality, and this the function of company changes in process of product quality forming [5, 7, 8]. The organization can take leading function in this process, as it has during designing, production and delivery of products to customer, or it can play only helping function realized on stages of use, exploitations and of the removal product [7].



Fig. 1. The factors forming quality products requirements [7]

The quality management system in organization should control the quality of every phase of product life cycle.

These phases can include: market research and product development, process research, planning, and development, purchasing, production, packaging, and storage, marketing, sales, distribution, and delivery, product installation, service, and support, product disposal or recycling (fig.2). However not all of mentioned activities take place in every company. It depends on area of activity and complexity of offered services [7,9,10].

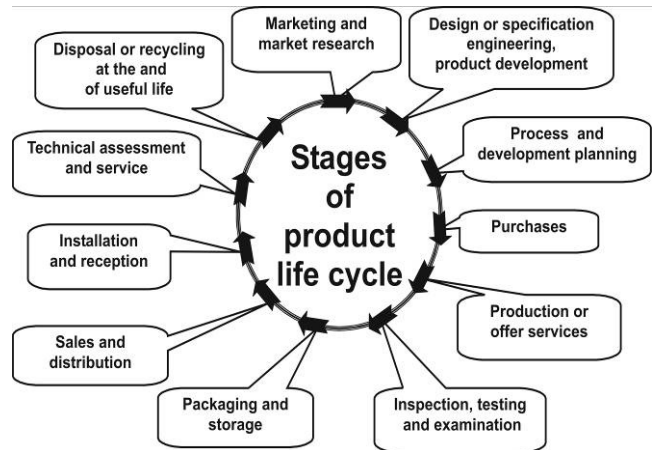


Fig. 2. The acts in product life cycle [7,9,10]

## 3. Model of quality research and estimation methods based on product life cycle

One of the important aspects of realization of proquality work tasks is a proper choice of quality estimation methods, is used in three sphere of company: pre-production, production, after-production, and so on every stage of creating of the final product [1,6, 11, 12].

In the planning phase and designing phase the organization use, such quality tools as the benchmarking, brains storm, Analytical Choice of Constructional Materials (ADMK), Quality Function Deployment (Customer Voice – QFD), Failure Mode and Effect Analysis (FMEA), the statistical tolerances, techniques of reliability, regression, modeling and simulation [5, 7, 13, 14]. Benchmarking is the process of identifying, understanding, and adapting outstanding practices from organizations anywhere in the world to help your organization improve its performance [15, 16]. Brainstorming can be an effective way to generate lots of ideas on a specific issue and then determine which idea – or ideas – is the best solution. Brainstorming is most effective with groups of 12-15 people and should be performed in a relaxed environment. If participants feel free to relax and joke around, they'll stretch their minds further and therefore produce more creative ideas [7]. ADMK is the quality method which helps to decide which materials are possible to be used in company in economical aspects [9, 11]. Quality Function Deployment is used to translate customer requirements into engineering specifications. It is a connection between customers, design engineers, competitors and organization [17]. Resuming in the planning and designing stage, above mentioned methods should be used in transforming customer requirements in technical requirements and also describe preferences and also should be use for problems and lacks estimation – prevention works.

In the production phases the organization should use Statistical Process Control, and also FMEA, QFD and quality tools and also Poka-Yoke rules, Deming's rules, 5S. Statistical Process Control (SPC) is a method of monitoring, controlling and, improving a process through statistical analysis. In this method company should create and maintain the flow charts, estimate capability index of production and capability index of machine. Poka-yoke means "fail-safing" or "mistake-proofing", it is a method of preventing defects by putting limits on how an operation can be performed in order to force the correct completion of the operation [1,5, 7, 16, 17].

analysis of product modernity can permit the industrial company to identify of repeated negative effects which they should be corrected [7,9,10, 16, 17].

All this acts in company has to be connected by the people – collective activities and very useful, flexible transfer of information. Above presented considerations permitted on proposal of model of quality research and estimation methods based on product life cycle. This model can be use by the organizations (fig.3).

### 4. Conclusions

In Polish companies, quality of products is a result of many connected processes. Those processes are depended on the factors forming quality products requirements. At present time the organizations put "prevention strategy" which replaced "detecting strategy". This approach has influence on optimisation of production process and reduction of costs and spoilage. According to Quality Management System and Quality Control organization should use quality methods in the whole product life cycle. Such activities make it possible to apply the proposed model in continuous quality improvement.

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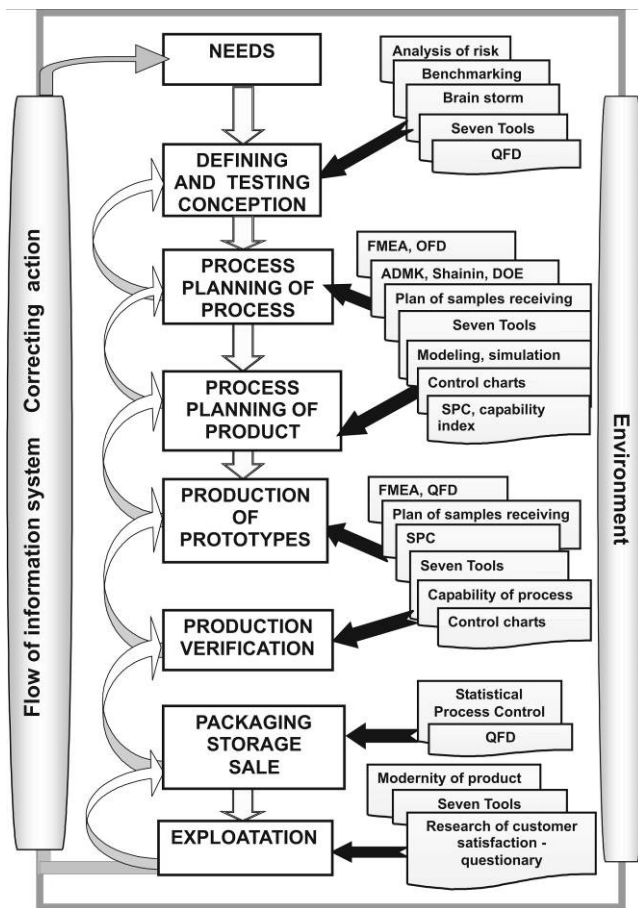


Fig. 3. Model of quality research and estimation methods based on product life cycle

E. Deming offered fourteen key principles for management for transforming business effectiveness.

5S is a reference to five Japanese words that describe standardized cleanup: Seiri - tidiness, organization, Seiton – orderliness, Seiso – cleanliness, Seiketsu –standards, Shitsuke - sustaining discipline. Resume this phase of life cycle product can permit on removal the defective product – prevention works. On the stage of product life cycle after sale the analysis of tendency,

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