



Quality costs in the production process

J. Michalska*

Division of Quality Management, Institute of Engineering Materials and Biomaterials, Silesian University of Technology, ul. Konarskiego 18a, 44-100 Gliwice, Poland

* Corresponding author: E-mail address: joanna.michalska@polsl.pl

Received 15.03.2006; accepted in revised form 30.04.2006

Industrial management and organisation

ABSTRACT

Purpose: The aim of this paper is showing the relationship of the quality costs with a production process. In this paper it was worked out and introduced the way of marking the documents with regard to the quality costs.

Design/methodology/approach: In the frames of own research it has been analysed the quality costs in the production process from the documents marked using the worked out way of marking.

Findings: On the basis of the own research it can be stated, that the majority of the elements of the quality costs can be counted on the base of generic costs arrangement through the foundation of the suitable accounts and the suitable marking of the source documents.

Research limitations/implications: In management practice, enterprises have to choose the way of the identification, control and analysis of the quality costs answering their needs, using among others proposed in this paper the way of marking the documents.

Practical implications: The suitable marking of the documents gives the possibility of recording the quality costs of given production process, and not only for the whole enterprise. But each enterprise should take into account the appropriate way of marking the documents to collect all the elements of the quality costs.

Originality/value: The extremely important problem from the point of view of the quality costs account and analysis is defining the places of cost formation in such way, that the costs would not be recorded according to the places of appearing but the places of formation. Thanks to these research it is possible to get the information about the quality costs of each process and this paper can be a simple rule how to collect the quality costs from each process.

Keywords: Quality management; Production process; Quality costs

1. Introduction

The globalisation of markets, growth of customers' expectations, widening competition in all spheres of relation between the customer and the supplier are the factors which at present extort the quality exhibiting in the strategy of the enterprise. Quality in the competitive world means the necessity of fulfilment of committed and waited customer's requirements who occupies the leading position on the market [1].

In organization every activity, in the result of which the entrance state is transformed to the exit can be considered as a process. From this, to act effectively it should be identified and managed the numerous, related processes, according to the idea of the process approach [2,3].

All organizations should realize strategies connected to the reduction of costs. They have to look for the ways of reducing the own costs at a high quality level, through the liquidation of the failures' sources, the enlargement of rentability and efficiency of working. From here also, it is extremely important the role of the quality costs account as the coefficient of efficiency of realized activities [1].

The quality costs measurement and their monitoring should be the continuous informative process being the basis to undertaking by managers appropriate activities of a strategic character, and also the continuous improvement of the organizational, technological, economic or legal solutions [3].

The aim of this paper is showing the relationship of the quality costs with a production process. For the appropriate isolation of the quality costs in a production process it should suitably be marked the source documents. In this paper it was

worked out and introduced the way of marking such documents with regard to the quality costs.

2. Quality management in the organization

The quick progress of the knowledge development in many areas places larger and larger challenge for manufacturers. Among many criterions, the quality of production took the huge meaning. From here, the support of the whole enterprise's activity on the quality aims should be treated as a process, in which, both entry and exit is a customer [4].

In organization every activity can be treated as a system that serves to processing of materials and energy (entry) in finished products (exit) [4].

On the quality of each process consist the elements defining this process, which can be in measurable way diverse and which lead to the realization of the given qualitative parameteres of a product.

The basic factors which decide about the quality of the production are [2]:

- the quality of the constructional and technological documentation,
- the quality of the raw materials, productive materials and auxiliary materials,
- the quality of the machines, devices, instruments and tools,
- qualifications of the workers' employed in a production and control,
- the quality of the transport and warehouse services,
- the level of working conditions.

The ISO series 9000 standards are the basis of the designing and modernizing the working processes, optimization of the organizational structure, removing the factors causing the process disturbances, introducing the technological and measuring equipment not only to the production, but also in relation to the packaging, warehouse, conducting with the defective products etc. [5,6].

The implementation of the quality system results from the firm's strategy (assurance that a product, in continuous way, fulfils the technical and qualitative requirements as well as it answers the customer's requirements), and also from the economic reasons [6].

It should be underlined, that the cost usually is one of the basic criterions in designing process, according to which it values the advantages of a product. Cost is the most essential factor influencing on the construction and production process. The quality costs are the economic conditions of quality of run activities, which are the essential component of the implemented, and then functioning Quality Management System [3,5].

3. Quality costs in the production process

The necessity of matching the requirements of growing competitiveness needs the simultaneous fulfilment of the efectivity postulate and elasticity as well as it requires the production of the modern products at a possibly high quality and a low level of the own

costs. The cost is usually one of the basic criterions in designing processes. From here, in every activity the costs and quality of product have to be always considered together [7].

Every decision, so every activity realized by the individual man in the course of the article production is connected with appearing the definite costs as well as it has the influence on the amount of income got by the firm [8]. On these two factors depend the profit of the enterprise, which particularly in the conditions of the present market, quick technical and economic progress and more and more stronger competition can not be left to the accident. The level of articles and services quality influences from one hand on the height of income got by the enterprise, from the other hand on the height of occurred costs. It can be said about the profitable and cost function of quality [8,9].

In every organization the transformation of the entry elements (X) in the exit elements (Y) should be such effective, that relation between costs and benefits could assure to this organization in longer time the suitable financial shape [2].

The strategy of reducing the own costs has the huge meaning for competitiveness of the enterprises on a global market, and the amount and structure of costs should be helpful in the choice and realization of the long-term intentions by the management of the enterprise [10,11].

Introduction in the enterprise the registration and analysis of the quality costs is one of W. E. Deming's philosophy points, who tells that it should be constantly investigated the causes of defects in every activity of the enterprise, so to make fixedly all systems perfect. This leads to the growth of productiveness and the lowering of costs [12].

4. Own research

Considering the quality costs in the enterprise the extremely important step in implementing these costs is accepting their uniform classification.

The total quality costs are the sum of the outlays occurred by the manufacturer in the aim of achieving and the maintaining the definite levels of quality inside the enterprise as well as the outlays on activities assuring the quality of produced article outside the enterprise. They are linked to all phases of a product realization [13].

For the need of registration of the quality costs there are necessary unchangeable definitions of the elements of activities connected with the quality.

The fact which deserves the emphasis is that the quality costs should be always unambiguously qualified, recorded, systematically analysed and interpreted [13]. However in many cases, evaluation of their height has to be hold on the bases of conducted estimation and received settlements (definitions) - what part of the general costs and when it will be taken as the quality costs [14].

The quality costs account should serve to the measurement and pricing of costs connected with the assurance of a stable level of quality. The correctly led quality costs account makes possible the control of management of the enterprise as well as it is the base to undertaking the economic decisions [11].

From investigations results that the most problems and doubts are connected with the group of the prevention costs. It should be

noticed that every enterprise should fit the division of the quality costs to its specific working and define the elements of each group of the quality costs.

The knowledge about the causes of formation of these costs in a production process is essential to qualification of elements of groups in the quality costs. Production process can be presented as K. Ishikawa graph, in which every component of this process influences on the costs (fig. 1).

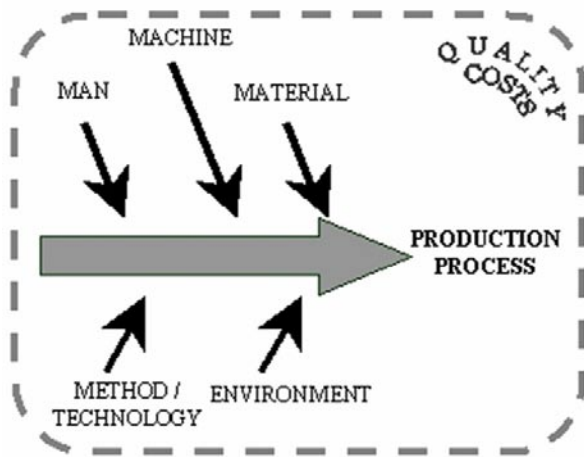


Fig. 1. The structure of a production process according to K. Ishikawa regarding the quality costs

In the organization for the proper recording of the quality costs it should be applied the activity-based account, and the source documents should be additionally marked (fig. 2).

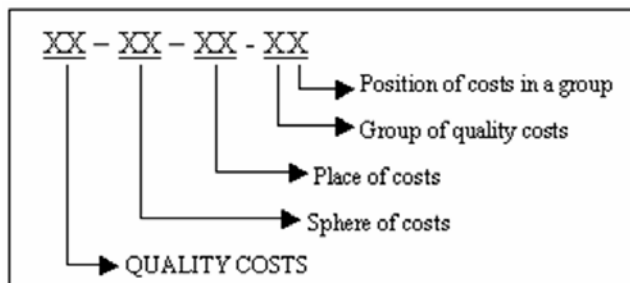


Fig. 2. The scheme of marking the documents connected with the quality costs

Legend:

Sphere of costs (01-04):

- 01) Pre-production sphere includes: marketing and market investigation, designing and development of a product, planning and development of a process, purchases.
- 02) Production sphere includes a production or service's offer.
- 03) Post-production sphere includes: verification, packing and storage, sale and distribution, installing and receipt, service, activity after sale.

04) Management sphere includes all actions connected with the assurance of quality not captured in above mentioned spheres, and connected with the organization management.

Place of costs (01-99) - it defines the cell in the enterprise where the quality costs appear.

The group of quality costs (1-4):

- 1) Prevention costs
- 2) Appraisal costs
- 3) Internal failure costs
- 4) External failure costs

Position of costs (1-...) – marks according to the detailed division of quality costs.

In the frames of own research it has been analysed the quality costs in the production process of the shaft from steel 40H (the element of a driving system) for three years (tab.1).

Table 1.

The quality costs sheet in the production process of the shaft from steel 40H

Type of quality costs	year 1	year 2	year 3
Prevention and appraisal costs	11,8%	13,1%	13,4%
Failure costs	4,3%	2,5%	1,8%
Total quality costs in the production process of the shaft from steel 40H	16,1%	15,6%	15,2%

The received results of the quality costs in the analysed process are the percentage part in the total quality costs of all production processes, accepting it as 100%.

On the basis of the own research it can be stated that knowing the elements of individual groups of costs and at good marking of the source documents it is possible to execute the quality costs analyses for chosen production process and not only for the whole enterprise.

5. Conclusions

On the basis of own research it can be stated, that the majority of the elements of the quality costs can be counted on the base of generic costs arrangement through the foundation of the suitable accounts and the suitable marking of the source documents. The remaining elements of the quality costs should be found in costs account according to the places of their formations. In management practice, enterprises have to choose the way of the identification, control and analysis of the quality costs answering their needs, using among others proposed in this paper the way of marking the documents. It gives the possibility of recording the quality costs of given production process, and not only for the whole enterprise.

The extremely important problem from the point of view of the quality costs account and analysis is defining the places of cost formation in such way, that the costs would not be recorded according to the places of appearing but the places of formation [3]. The important reasons, which should be taken into account in marking the places of recording of the quality costs is the principle of economy as well as indispensable number of

information. Number of these places depends on many factors, in this the size of enterprise, its organizational structure, degree of financial distinction by organization, the kind of relation with the suppliers and recipients, the customer requirements, the requirements resulting from the implemented quality management system, and received in the enterprise the accounts plan [5].

The quality costs analysis should be adapted to the specification of the enterprise. The degree of details of this analysis will depend on the demand on this range of information in given individual enterprise. The management of the enterprise should acquaint with the results of the analyse, in the aim of undertaking the definite workings on the quality improvement [14].

The problematic aspect of the quality costs analysis serves to the collection of current information relating to the basic amount of these costs, the cause - effect relationship, as well as creates the possibility of undertaking the decision connected with the removal of irregularity. These analyses are worked out quickly because they are the most often the basis to undertaking single decisions, aiming to the immediate removal of appearing irregularities.

The appraisal of efficiency of the quality system through the quality costs permits on the identification the strong and weak sides of the enterprise as well as on the qualification the activities aiming to the implementation in the enterprise necessary changes and its improvement [15].

References

- [1] J. Michalska, Factors creating the quality management in the enterprise, Proceedings of the Scientific International Conference „The intellectual capital as a chance on improvement of the quality management in the conditions of globalisation” INTELLECT’2005, Kazimierz Dolny, 2005, 187-191, (in Polish).
- [2] I. Durlik, Management Engineering, Part.I: Strategy and designing of the production systems, Placet, Warsaw, 1998, (in Polish).
- [3] Z. Zymonik, Quality and productiveness in the enterprise’s management, Economy and Organization of the Enterprise, 5 (1998) 6-8, (in Polish).
- [4] B. Czyżewski, Quality assurance during realization of a technological processes, Quality Problems, 8 (1999) 12-20, (in Polish).
- [5] S.Tkaczyk, J.Michalska, Quality costs in the quality management, Proceedings of the Conference „The integrated management systems - quality, environment, technology, safety”, Szczyrk, 2000, 427-434, (in Polish).
- [6] R.S. Schuler, D.L. Harris, Managing Quality, Addison-Wesley, Reading, 1992.
- [7] J.Michalska, Quality costs account as the tool of efficiency appraisal of the enterprise’s activity, Proceedings of the Scientific International Symposium, Zielona Góra, 2001, 104-109, (in Polish).
- [8] A. Hernas, The bases of the quality engineering, WPŚL., Gliwice, 2004, (in Polish).
- [9] S. Tkaczyk, J. Michalska, Cost - quality (CQA) analysis, Proceedings of the 10th Scientific International Conference „Achievements in Mechanical and Materials Engineering” AMME’2001, Gliwice-Zakopane, 2001, 593-596.
- [10] J. Łańcucki, Quality management in the enterprise, OPO, Bydgoszcz, 1997, (in Polish).
- [11] J.Michalska, S.Tkaczyk, Analysis of Polish enterprises’ activity in the area of quality costs, Proceedings of the 11th Scientific International Conference „Achievements in Mechanical and Materials Engineering” AMME’2002, Gliwice-Zakopane, 2002.
- [12] J.Michalska, Quality costs as the tool of the quality improvement, Proceedings of the VIIth International Conference „The conditioning of enterprise’s success in the economy based on the knowledge” SUCCESS’2004, Kazimierz Dolny, UMCS, Lublin, 2004, 99-102, (in Polish).
- [13] S.Tkaczyk, J.Michalska, Quality costs and Pareto – Lorenz (ABC) analysis, Proceedings of the Conference „Materials, Mechanical & Manufacturing Engineering”, Gliwice, 2000, 313-318.
- [14] J. Michalska, The usage of the quality – cost analysis in a production process, Proceedings of the 11th Scientific International Conference on the Contemporary Achievements in Mechanics, Manufacturing and Materials Science CAM³S’2005 (former Countrywide Conference on Contemporary Achievements in Materials Science CAMS), Gliwice-Zakopane, 2005, 666-673.
- [15] J. Michalska, The usage of The Balanced Scorecard to the estimation of the enterprise’s effectiveness, Journal of Materials Processing Technology „Elsevier” 162-163 (2005) 751-758.