June 21, 2011 (Tuesday) 55th EOQ Congress

CONCURRENT SESSIONS **Tuesday 13:30 – 17:30**
KEMPINSKI HOTEL CORVINUS **Erzsébet tér 7-8, Budapest V.**

REGINA BALLROOM III. **Tuesday 15:30 – 17:30**

12.2. MANAGEMENT OF QUALITY OR QUALITY OF MANAGEMENT II.

Session Chair: ***Asbjørn Aune****, Norwegian University for Science and Technology, Norway*

16.40 Returns on Quality - ROQ Model
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Returns on Quality – RoQ Model

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1. Introduction

The beginning of the 80's of the previous century may be characterised as a revolution in the field of quality. To certain degree, the revolution was initiated by the dramatic development of Japanese economics and the fact that the Japanese experts and later also the American specialists invited to Japan (Juran, Deming) accented the fact.

In the USA, the new approach to quality was manifested by the fact that economic organisations focused on the elaboration of various quality programmes and acquisition of various awards, which was an accompanying sign of the new approach (Malcolm Baldridge award, Edison award, attempt to acquire a Japanese Deming award), while in Europe, the new approach was characterised by massive promotion of ISO standards in quality management systems as well as certification of the systems. The approach has still been markedly supported by the EU bodies and consequently also national bodies in individual EU countries. The quality approach in Slovakia is actually characterised by the following sequence of steps:

- Preparation for certification of quality management system,
- Building the system,
- Certification of system,
- Application of quality programmes (TQM, Six sigma),
- Effort to acquire one of the national awards either for quality management system or product properties.

It is interesting that neither the Slovak literature on quality nor professional community do mention that majority of the projects aimed at building the quality management systems and various quality programmes have failed. This obviously does not mean that the acquisition of a certificate or another support in the field of quality is considered a failure. The aim should be to achieve the results better than those achieved before the application of the

abovementioned projects, rather than a pure acquisition of a certificate. That means that the costs for the projects must be lower than the yields achieved due to the implementation of such project. As documented in sources, numerous enterprises thus () either abandoned those programmes or dramatically reduced them; there were even some cases of bankruptcy due to the application of such programmes. Neither do the Slovak sources mention how many enterprises, having won a quality certificate or award, went bankrupt. The bankruptcy under the conditions of economic crisis definitely cannot be ascribed to the application of quality projects. On the other hand, if quality projects are effective, the enterprise should be protected to certain degree from the impact of the economic crisis.

There is a question whether quality does or does not have a direct influence on economic results of an enterprise. Authors of the current paper are convinced that such direct influence does exist, yet certain principles (e.g. those accented by Juran, contact with customers in particular) have been neglected in the field of quality management. Just look at the contents of ISO standards. Customers are mentioned, yet the methods of contact, assessment of post-production stages and particularly their feedback on research and development are missing in the standards. The first version of ISO standards defined the role of marketing in quality management (Juran's idea that marketing represents both inlet and outlet of quality management), while this was omitted in the later versions. Similarly, the subject of economy quality was stated just marginally in ISO standards. The target should not be enhancing the technical properties of a product, or eliminating the active approach of employees towards quality by directive standards, but rather increasing the profitability of organisation. Companies seem to forget that a product must meet customer demands, yet the main aim is increasing the profitability of organisation; otherwise all the effort to increase quality is fallacious. Increased attention should be therefore paid to communication with customers while emphasising the economic returns on quality.

2. Returns on quality

Doubts regarding whether quality has or does not have a direct impact on the economic results of a company leads to the fact that management in many enterprises, instead of seriously dealing with quality, declares the increase of quality and acquisition of certificate just formally, thus considering the task accomplished. Deming, one of the major gurus of quality, claimed (correspondingly to the concept of quality management in his time), that there is not a direct connection between financial results and quality, as financial returns on quality are

invisible and unrecognisable. Such (mis)concept of management has been revealed by the U.S. General Accounting Office claiming that just a minority of enterprises-finalists of the Malcolm Baldridge award proved some savings or better economic results achieved due to quality programmes. Authors of this contribution take the liberty to claim that the situation in Europe is even worse in this context.

Quality is a very complex phenomenon influenced by numerous factors. When elaborating any quality programmes, three major aspects have to be taken into account:

- technical aspect; a product must be designed and manufactured with the properties assuring that the customer satisfaction will be met,
- communication aspect; customers must be convinced about the advantage of an offered product's purchase; thus the acquisition of new customers and retention of current ones are the matter ofcommunication aspect, yet it is the communication aspect which is not sufficiently regarded in quality programmes,
- economic aspect; the aim of the quality programmes should be neither increasing the technical level of individual properties of the manufactured products, nor increasing the level of satisfying the customer needs, but achieving the advanced technical level of the manufactured products and satisfying the customer needs, i.e. achieving better economic results and profitability of the enterprise.

Since technical aspect is primarily a matter of constructers, developers and managers of production processes, this paper focuses on the communication, economic aspects in particular. As for the communication aspect, it is worth to emphasise that the achieved economic results of quality depend on effective communication with customers, and the economic aspect must therefore express the main aim of quality programmes and quality increase. Neglecting these facts necessarily leads to the failure of programmes or projects of quality increase. The relation between the abovementioned three aspects can be expressed by the triad of quality.

Sides of the triangle in the triad of quality express the activities that must be implemented in order to assure the success of quality programmes, while the basis expresses the technical aspect of quality (a product must be designed and manufactured with certain properties), and the legs express the communication aspect of quality (only an effective communication with customers and monitoring their demands and satisfaction with the supplied products can help retain current customers and attract new ones). Communication is generally carried out by the department of marketing, while it is the communication itself which is a pre-requisite of effective quality programmes.

Angles of the triangle express the results of activities. The results of activities in the field of design are products with certain properties, while the result in the field of communication with customers is the manufacturer's market share, and subsequently the increase of market share is the supposition of good economic results achieved via quality programmes. The top of the triangle expresses the economic result of the previous activities and can be thus indicated as Return on Quality (RoQ).

The sequence of the quality increase process can be expressed by four basic steps:

- Step 1: carrying out the research targeted to determining the customer requirements and assessing the organisation's ability to meet those requirements; elaborating the list of requirements and harmonising the customer requirements with the organisation processes.
- Step 2: carrying out the communication with customers in order to convince them about the organisation's ability to meet customer expectations,
- Step 3: assuring the impact of the manufactured products'quality on customer satisfaction,
- Step 4: measuring the market share and the impact of quality on the achieved profit. Within this step, it is necessary to determine the quality programme related costs, net present value (NPV) due to the increased market share and to compare the profit improvement with the costs associated with the implementation of quality programmes.

Triad of quality provides a new insight into quality economics. Most companies currently apply the approaches based on PAF model in quality economics. The model which appeared in 1946 does not regard the changes having taken place in quality management and the concept of quality itself. PAF Model is exclusively focused on technical aspect, as its original objective was to seek an optimum level of low-quality production. This also defined the structure of so called quality costs used in the model, which is focused on low-quality rather than quality, though losses due to low-quality production and product quality are in fact caused by wasting material, energy and workforce involved in particular productionprocess, thus having nothing in common with quality. This does not mean that, directly decreasing the economic result of an enterprise, the losses should not be decreased, yet it is not quality costs. Similarly, cost appraisal of costs is in fact a component of production process costs, while prevention costs are a component of the costs for training the staff.

Regarding the abovementioned triad of quality, we are presenting a brand new structure of quality costs focused on costs for quality assurance. The structure of quality costs comprises the following groups:

- costs for research, development and preparation of production,
- costs for retaining current customers,
- costs for acquiring new customers.

As for group 1, it actually expresses the slogan saying that 80% of quality is created in pre-production phases. If this is true, then costs in this field are quality costs. Costs to retain current customers actually represent the total of all benefits an organisation provides to loyal customers including the costs for post-production phases. Those costs may be considered the ones for defensive strategy of a company. Costs for acquiring new customers represent the costs particularly for advertising, as well as the costs for market research, identifying the customer requirements etc. Those may be considered the costs for offensive strategy of a company.

The effectiveness of such approach requires building a system for monitoring and assessing the quality costs, comprising the following steps:

- defining the cost issues that will be included into particular groups of quality costs,
- determining responsibility for issuing the initial documents for individual cost issues,
- establishing a system for collection and summarisation of quality costs,
- assessing the impact of quality costs on the company profit.

There are several options to assess quality. ROQ indicator is one of them. This indicator takes the following form:

$$ROQ = \frac{P}{CRD + CD + CO}$$

where

P is profit from the production of particular product,

costs for research and development (CRD), costs for defensive strategy (CD) and costs for offensive strategy (CO).

Denominator in the formula says that profit is not created barely by quality cost. The ratio does not directly express the effectiveness of quality system. However, if to examine the ratio in a sequence of time, we can indirectly deduce the effectiveness of quality management system from whether the variations of the ratio exhibit positive or negative development. When creating this indicator, the influence oftime factor should be taken into account. If a

product is manufactured for more than 1 year, costs for research and development are single-shot; ROQ formula should then involve only the ratio of the costs attributable to 1 year of the product manufacturing.

The abovementioned indicator applies to one product only. If a company manufactures more products and needs to express ROQ indicator for the whole enterprise, the total indicator will include also the totals of cost issues for all products.

Another option of how to express the achieved profit is the indicatorof present net production enhanced by the indicator of quality costs. The indicator of present net production takes the following form:

$$NPV = \sum_{i=1}^{n} \frac{CF_t}{(1+k)^t} - (C_{rd} + C_i)$$

where :

NPV is present net production,

CF is cumulated value of cash flow,

Ci are investment costs for particular product,

CQ are quality costs for particular product,

k is corporate discount rate

t are costs for the years 1 to n

n is manufacturing period of a product in years.

3. Conclusion

Besides technical aspect, quality management should involve also communication and economic aspects in order to be successful. It is essential regarding the effectiveness of quality management, the profit achieved and profitability of a company. Triad of quality discussed in the paper provides a new aspect of quality costs, focusing on quality itself rather than on low-quality as in case of PAF model.

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