

PERFORMANCE MEASUREMENT PROCESSES IN THE QUALITY MANAGEMENT SYSTEM

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Key words and phrases: correlation coefficients and test of the significance in assessing the effectiveness of the quality management system's processes; the cluster approach; quality management system's processes; impact of the quality management system on the MINOR model.

Abstract: The paper analyzes the model, which assesses the impact of the MINOR. Its shortcomings are pointed out. The possibility of its improvement is determined. The process approach, which assesses the impact of the quality management system is offered.

Performance Indicators are the mapping of the implemented actions in the quality management system, which are selected in the decision-making. Any new decision and thus the set of the implemented actions' changing are reflected in the dynamics of the relevant performance indicators. Therefore, it is appropriate to use the growth as a sign of the ordering indicators.

In accordance with these requirements for measuring the impact of the quality management system and identifying activities, the model of the index valuation impact assessment (**MINOR**) is proposed.

The essence of the MINOR is that the impact of the quality management system characterizes the level of the achievement as a condition for the organization's results achievement.

In our view, the model MINOR is not generalized in terms of a systematic approach of the quality management. The figures in it are insufficient to assess the impact of the quality management system's processes.

The comprehensive assessment of the quality management system can be represented as a measuring arithmetic indicator of the evaluations of the quality management system's processes.

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On this account, we classify all processes of the quality management system in four groups:

- 1) management processes;
- 2) resource management processes;
- 3) product's life cycle processes;
- 4) monitoring and measurement processes.

The management's quality indicators as well as the financial, social ones are important for the impact assessment of the first group of processes, which include quality policy, quality manual, records management, document management and others.

It is also possible to offer the indicators of both economic and social problems in the second group (level of costs associated with procurements, salary level, degree of motivation, quality of regulation).

The MINOR factors, which are proposed, influence the effectiveness of the quality management processes. They are shown in a very shortened form. In practice, there are much more factors. It is necessary to provide the most significant factors for the analysis. It is proposed to assess the essentiality by the correlation coefficient. As the quality management system's assessment indicators have both quantitative and qualitative characteristics, then the rank correlation coefficients are selected for the study.

We have proposed to improve the MINOR methodology. In favor of this decision, there are the following considerations.

1. The values of rank correlation coefficient, calculated by us on the basis of the statistical data of the confectionery company «TAKF» (respectively, by the year – $K_{\text{спирмена}} = 0,415; 0,365; 0,006$ and $K_{\text{кendela}} = 0,333; 0,267; 0,000$) indicate that the relationship between selected indicators for the impact assessment of the quality management system is not sufficiently strong.

It is known that the closer $|r|$ to 1, the closer the relationship. The sign “ r ” indicates a direct (if “+”) or backward (if “-“) dependence.

In our case, the relation between the indices is moderated to weak. In addition, the communication may be considered as statistically significant, if the values of Spearman's and Kendall's rank correlation coefficient greater than 0,5.

Consequently, those indicators that on the basis of the MINOR were involved in the implementation of the quality management system's evaluation mechanism on TAKF, should be reviewed with regard for their content part and additions.

2. It is necessary to determine the Student's t-test to confirm the significance of Spearman's rank correlation coefficient. Its value is considered to be statistically significant thing, if $TR > t_{kr.} (K = n - 2)$.

Regarding TAKF, Student's-test was equal to 1,70648.

The figures in the model MINOR can be used as benchmarks, but the resulting estimates will not be effective, as it is shown by a numeric expression of the rank coefficient and its t – criterion.

3. It is very difficult to get all parameters together in the quality management system's impact assessment and to provide the correlation on the

highest possible level. So we suggest representing the effectiveness's estimation rate of the entire quality management system as a set of successful evaluations of the quality management system's processes. For each of the quality management system's process it is easier to select indicators that characterize the effectiveness of the process or just a group of related processes.

It is recommended to use absolute and relative forms of their expression in the calculations. However, the use of relative meanings makes the model dynamic, and, as a result, more efficient.

4. Calculation of the total effective assessment is carried out by summing with the simultaneous weighing of the so-called private evaluations of processes.

5. Rank correlation coefficients used in the model MINOR are applied to determine the closeness of the relationship between quantitative and qualitative characteristics, the latter of which have a numeric expression. But in the quality management system there are some qualitative measures that cannot be immediately quantified. So, it is necessary to pre-calculate them. In addition, the rank correlation coefficients parameters should be equal, with the same direction vector, which can rarely be achieved.

6. As the effectiveness of the quality management system's processes is characterized by several indicators with different units of measurement it is necessary to analyze the indicators profoundly. It means the following: if the large value corresponds to a higher score, then such a rate is considered to be a stimulant, and on the contrary, the rate which influences the effectiveness of the process negatively, is deterrents. Then the rates are subjected to standardization. The best value gets 101 points, the worst – 1. Actually, this means the cluster approach to the assessment mechanism.

7. Cumulative impact assessment of the entire quality management system is represented as a measuring arithmetic average meaning from the successful evaluation of the quality management system's processes. As a measuring tool it is suggested to take the significance (value) of each process in the quality management system in the consideration of its role in implementing business strategy. It is recommended to use an expert method or a method based on the analysis of statistics with the calculation of coefficients of the hierarchy to determine the significance of each process.

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Методика оценки результативности процессов в системе менеджмента качества

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Ключевые слова и фразы: кластерный подход; коэффициенты корреляции; критерий значимости в оценке результативности процессов СМК; модель МИНОР; процессы СМК; результативность деятельности СМК.

Аннотация: Проанализирована модель оценки результативности, МИНОР, выявлены ее недостатки, обоснована возможность ее совершенствования, и предложен процессный подход к оценке результативности СМК.

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