

A comprehensive assessment of product quality in the relation to anthropogenic impacts on the environment

A.I. Brakovich¹⁾, V.L. Kolesnikov¹⁾, P.P. Urbanovich^{1), 2)}

¹⁾ Belarusian State Technological University, Minsk, Belarus,
E-mail: brakovich@yandex.ru

²⁾ Catholic University of Lublin, Lublin, Poland

Product quality is most often achieved by changing the operating parameters of the process. This, in turn, can lead to an increase in anthropogenic impact on the environment. In this regard, especially relevant is an integrated environmental assessment. Based on the experience of environmental practices to a comprehensive environmental assessment have been developed a number of requirements. Some of the most important requirements are the following:

- integrated environmental assessment must be united and be a certain way formed mathematical expression that takes into account the partial evaluation of individual factors;
- methodology for conducting private evaluations (evaluations of individual factors) should be focused on being independent, and at the same time, be part of an integrated environmental assessment;
- formation of an integrated environmental assessment must be simple enough, allowing its use in the units guarding the environment.

In a real situation enterprises assessment is based on more than a dozen criteria: performance, cost to profitability, air and water pollution, etc. We live and work in multicriteria world where goals are often conflicting. For example, productivity and profitability to maximize, and the production cost and pollution – to minimize [1, 2].

For integrated environmental assessment different mathematical methods are used: the linear estimates, component and factor analysis, cluster analysis, etc., which are limited in their usage because of several shortcomings [1].

A new method of multicriteria evaluation of the enterprise activity on production, economic, environmental and consumer indicators is proposed, where the synthesis assessment criterion performs a complex function of desirability. It allows to convert an array of output values of large-scale to a single-column generalized observations.

Mathematical foundations of complex function desirability set out in the well-known expression [1-3].

The example of calculation for the company, which produces printing paper is given. It shows that the proposed method of multicriteria evaluation of the enterprise activity, where as the synthesis assessment criterion performs a complex function. It allows to evaluate the desirability of such activities on industrial, economic, environmental and consumer indicators.

References

- [1] Kolesnikov V.L., Zharsky I.M., Urbanovich P.P.: *Computer modeling and optimization of chemical and technological systems*, Minsk BSTU, 2004, 532 p.
- [2] Kolesnikov V.L.: *The mathematical bases of computer modeling of chemical and technical systems*, Minsk BSTU, 2003, 312 p.
- [3] Kolesnikov V., Romantsevich A., Urbanovich P., Brakovich A., Zarski I.: *Modeling and the process analysis in engineering ecology*, Przegląd Elektrotechniczny, 3/2008, 2008, p. 155-157.