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UDC 338.45

METHODOLOGICAL TOOLS FOR ASSESSMENT OF BALANCE IN THE DEVELOPMENT OF INDUSTRIAL ENTERPRISES

МЕТОДИЧЕСКИЕ ИНСТРУМЕНТЫ ОЦЕНКИ СБАЛАНСИРОВАННОСТИ РАЗВИТИЯ ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЙ

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Keywords: balanced development, methodological approach, integral indicator, textile and sewing enterprises.

Ключевые слова: сбалансированность развития, методический подход, интегральный показатель, текстильные и швейные предприятия.

Abstract. The article summarizes the methodological tools for assessing the balance of development of industrial enterprises. The key relative indicators characterizing the

structural, dynamic and intensive balance are highlighted on the example of textile production and clothing in Belarus. An integral indicator was developed on the basis of applied statistics methods and the main stages of the implementation of the methodological approach in assessing the balance of development of enterprises for management decision making were highlighted.

Аннотация. В статье обобщён методический инструментарий оценки сбалансированности развития промышленных предприятий. Выделены ключевые относительные показатели, характеризующие структурную, динамическую и интенсивную сбалансированность на примере текстильного производства и одежды Беларуси. Разработан на основе методов прикладной статистики интегральный показатель и выделены основные этапы реализации методического подхода в оценке сбалансированности развития предприятий для выработки управленческих решений.

Theoretical and applied issues of methodological support for assessing the balance of development of industrial enterprises (organizations) of various types of activity are developed in the works of scientists Tkachenko E.S., Rybachuk M.A., Kuzovleva I.Yu., Mordvinov S.V., Fomin V.P., Alifanov K.A., Evseev D.A., Ulyanova O.B., Tsykavkin N.M. and others, see Table 1.

Based on the economic analysis of light industry (according to OKED, subsection CB, sections 13–14) in the intersectoral balance of Belarus and reports on the socio-economic development of textile and garment enterprises of the Bellegprom Concern for 2014–2016, the author of the article proposed relative indicators for assessing the level of development balance. By preliminary calculation, all relative indicators were formed into the following groups, see Table 2.

Structural balance, meaning the ratio of structural parts in the aggregate as a whole. With the help of structural relative indicators, it is possible to assess the internal structure and content of the phenomenon under study. Dynamic balance characterizes the change in the growth rate of indicators over time. The growth rate shows how many times the indicator of the current period is in comparison with the baseline. Intensive balance is the ratio of opposite absolute values to each other and characterizes the level of economic and social development.

To assess the level of balanced development of enterprises, the most important element of the methodology is the technical analysis toolkit applied to the study of complex organizational systems. A number of authors single out in their works probabilistic-statistical and economic-mathematical methods for the economic assessment of the balance and stability of the economic system, including works of E. V. Broilo, S. N. Bobylev, S. G. Ezerskaya, Yu. N. Galitskaya, M. V. Kharchevnikov, E. R. Miskhozhev, M. A. Makarova, A. V. Schmidt, V. V. Ioffe, B. P. Rukin, N. S. Popova, A. N. Tischenko. Heuristic methods in modeling the assessment and forecasting the balance of development and sustainability of organizations are practiced by T. E. Melnik, Yu. M. Suleimanova, N. A. Khomyachenkova, S. Yu. Tchmel, F. M. Safin, O. N. Zaitsev, Yu. N. Galitskaya, E. A. Kazyuka, M. E. Tsybareva, R. V. Rusinov and others.

Table 1 – Methodological approaches of the authors to assessing the balance of development of industrial enterprises

Author	Research direction	Economic activity (industry)	Methods and integral indicator for assessment
Tkachenko E.S	management processes	meat processing production	scoring of the actual values of indicators
Rybachuk M.A.	balanced system structure	industrial enterprise of various organizational and legal forms	− index of systemic balance; − return on assets (ROA)
Kuzovleva I.Yu	designing a balanced innovation infrastructure	economic systems at the macro, meso and micro levels	geometric mean formula and integral exponent
Mordvinov S.V.	methods for assessing the balance of development	on the example of timber industry enterprises	selection of relevant indicators (based on the method of expert assessments)
Fomin V.P	methodology for the formation and analysis of balanced development indicators	electrical industry and rocketry	− methodology for rating evaluation of fractional time intervals; − a modified methodology for dynamic rating assessment by percentage distances has been developed; − the methodology for assessing economic sustainability is based on the identification and generalization in the integral interpretation of trends of the degree of balance by its levels and types
Alifanov K.A.	mathematical models for the formation of a balanced structure of the product range	textile enterprises	a complex of mathematical models for calculating the balance of the product range and the structure of the production program of the enterprise based on the apparatus of the support vector machine has been developed
Tsykavkin N.M.	formation of a sustainable development strategy	garment industry of the Russian Federation	a method of forming a strategy for sustainable development of holdings of the garment industry using the method of expert assessments. Application of the "VBM-approach" − defines the concept of management aimed at the qualitative formation of strategic and operational decisions at all levels of the organization.

Source: compiled by the author.

Table 2 – Relative indicators for assessing the level of balanced development of industrial enterprises of Bellegprom Concern

The name of the group of relative indicators and their designation		Indicators and their units of measurement
Structural balance	K_S	− the share of exports of goods and services in the production of goods and services, % − the share of labor costs in the structure of costs for the production of goods, % − the share of imports in the production of goods and services, % − the share of imports in the cost of production of goods and services, % − the share of exports of goods and services in the foreign trade turnover of the industry, % − the share of material costs in the structure of costs for the production of goods and services, % − share of net profit in added value, % − the share of value added in the production of goods and services, %
Dynamic balance	K_D	− growth rate of exports of goods and services, % − growth rate of added value, % − growth rate of proceeds from product sales, % − growth rate of production costs, % − growth rate of imports of goods and services, % − growth rate of output of goods and services, % − growth rate of net profit, % − growth rate of material costs, %
Intense balance	K_I	− added value per 1 rub. release of goods and services, rub. − added value per 1 rub. cost of goods sold, rub. − added value per employee, RUB mln. − added value per 1 ruble of imports of goods and services, rubles. − added value per 1 ruble of export of goods and services, rub. − added value per 1 ruble of fixed assets, rub. − ratio of export to import

Source: developed by the author.

In economic knowledge, it is customary to refer to the number of quantitative methods as two key methods: mathematical and statistical ones. In their applied meaning, these methods are often combined into a general one – the econometric method [1, p. 129].

To determine the level of balanced development of organizations, it is proposed to use the author's integral coefficient of development balance (R), the value of which is calculated on the basis of applied statistical analysis methods and the application of the SPSS application package designed to process a large amount of data [2–4].

As a result of multivariate factor analysis, the values of the factors were determined (based on the "Varimax" rotation method), integral coefficients were constructed that characterize the level of balanced development of each studied textile and garment enterprise for each period from 2014 to 2016, see Formula 1:

$$R_{i\,(t)} = d_1\,K_{1i} + d_2\,K_{2i} + d_3\,K_{3i} \qquad (1)$$

where $R_{i\,(t)}$ – integral coefficient characterizing the level of balanced development of the i-th enterprise for the t period, rel. units; $d_1 \geq d_2 \geq d_3 > 0$ is the share of the total variance explained by the main factors K_1, K_2, K_3, constructed in descending order of their values (weight coefficients reflecting the relative importance of indicators, their "contribution" to the value of the integral coefficient), rel. units; d_1 – variance of the first principal component (with the largest eigenvalue – λ_1) explains the share of its variance in the total population, rel. units; K_{1i}, K_{2i}, K_{3i} – normalized (standardized) values of the main factors K_1, K_2, K_3 for the i-th enterprise, rel. units.

For comparability of indicators measured in different units, the initial indicators were normalized (standardized), that is, reduced to a single measurement scale from the interval [from -1 to +1].

According to Formula 1, enterprises are assessed and ranked according to the value of the integral coefficient of development balance.

Thus, we have developed a methodological approach for a factor-based economic assessment of the level of balanced development of textile and clothing enterprises of Bellegprom, which includes a number of stages:

Stage 1. Pre-processing of primary data;

Stage 2. Standardization of quantitative indicators (based on "MS Excel");

Stage 3. Modeling the assessment of the level of development balance;

Stage 4. Calculation of the integral coefficient of balanced development for each enterprise (based on "MS Excel" and standardized indicators);

Stage 5. Grouping of enterprises by the level of development balance (based on the average intergroup value of the integral coefficient).

Based on the results of ranking enterprises by the value of the integral coefficient of balanced development, we have developed an algorithm for making management decisions, including the calculation of general criteria (coefficients), according to the values of which all enterprises were assigned to groups with appropriate management recommendations to ensure balanced development.

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