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MODEL SCENARIOS OF SUSTAINABLE DEVELOPMENT STRATEGY IN THE FORMULATION OF MECHANISMS FOR ENTERPRISE SUPPORT RESOURCES

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Abstract: *In this article we have considered methods of information and analytical support used in the formulation of a sustainable economic development strategy for industrial enterprises. The purpose of this study is the methodological and applied justification for choosing a scenario for sustainable development in the system of strategic management of industrial enterprises in order to improve their performance indicators, competitiveness, and social responsibility. We have offered a methodical approach for the criterion assessment of qualitative, quantitative, and financial indicators of both the enterprise and the external environment's strategic potential. Analysis of enterprise management systems has been carried out on the basis of calculations taking into account the national program of sustainable development, and a further strategy for the development of industrial enterprises has been offered. It is substantiated that, to form effective strategies aimed at ensuring sustainable economic development, an analytical system of support for strategic decisions is needed. One of the components of such a system is a set of adequate mathematical models that will determine the key factors of the internal environment at an enterprise that affect its sustainable development. Its usage in practice will allow for the optimization of costs in functional areas when developing corporate decomposition strategy, and will allow for the building of determining factor models, the reflection of the relationship between key indicators, the compilation of forecast reports, and the performing of both situational and sensitivity analysis.*

Keywords: *strategy, sustainable development, model, management decisions, industrial enterprises, efficiency.*

JEL: *G1*

Introduction

Presently, we consider to be essential the procedures for assessing the options for (or choice of) development strategy based on the results of complex informative experimental research conducted on the basis of several dynamic economic and mathematical models. These procedures are characterized by the direct participation of decision-making justification in modeling research, using computational procedures through balancing the combination of an experimental computer modeling approach with different analytical methods and approaches. These include: expert and intelligent systems; logistical approaches; and simulation–optimization (iterative) computational procedures, and are integral components of analytical tools of theoretical and applied economics.

At the same time, the study of management systems internationally has shown that managers and analysts of many companies compile not only financial statements for the last year, but also projected financial statements for several years. These documents are intended for both internal planning and for provision to external users.

Methods

The principles of forecasting are classified into three groups of methods (Velesko and Loginov 2001): extrapolation, modeling, and expert judgment. Methods of extrapolation (least squares, moving averages, exponential smoothing, etc.) are based on statistically justified trends in the changes of certain quantitative object characteristics. Extrapolation methods are the most common among all methods of economic forecasting (Velesko and Loginov 2001). Extrapolation is defined as a way to find function beyond the area of its definition, using information about this function's behavior from points within its defined area.

Modelling methods use techniques of structural, network, and matrix modelling, amongst others. They make it possible to use selected models to obtain financial forecast indicators.

Expert judgement methods are informal methods, and are used in cases where it is impossible to take into account the impact of many factors due to the significant complexity of forecasting objects. When formalized forecasting methods cannot be applied, it is necessary to use the knowledge and experience of experts (Velesko and Loginov 2001).

Forecasting by using the percentage of sales method is to increase (or decrease) indicators of income from the sale of products (works, services), balance sheet items, and statements of financial performance (except those that do not depend on changes in sales) by the same percentage. Predictions regarding the direct dependence on income change because of sales rates, and other items should be verified on the basis of empirical data (Gontareva 2011; Chorna, Zhuvagina, and Filipishyna 2014).

Forecasting by using the regression method (provided there is a linear or nonlinear dependence between indicators that are predicted) makes it possible to obtain the future value of a performance indicator, which is a random variable, depending on the change of one or several indicators.

Forecasting based on the method of normative coefficients aims to obtain an optimal balance sheet and statement of financial performance, based on indicators such as equity capital profitability, or liquidity. This forecast is used to assess those changes in assets and sources of their formation that need to be made in future to achieve optimal profitability and a stable financial condition. The method of preparing projected financial statements based on normative coefficients is widely used by enterprises whose management is based on the concept of strategic control (Velesko and Loginov 2001; Gontareva 2011; Gonchar 2014; Nazarova et al. 2020).

In cases when the forecast of financial statements is based on future management decisions, it is useful to use the method of regulation of items. In this case, the percentage of sales method, regression equations, or normative coefficients cannot be applied, as they will lead to inadequate forecasting. Strategic management decisions can radically change the current structure of a balance sheet, and lead to a temporary reduction in profitability if there is a need for technical re-equipment, research and development, etc. Forecasting based on the regulation of items is used when enterprise administration makes significant, sometimes far from optimal in a financial context, management decisions that are strategic and might be linked to self-preservation in the context of further competition.

The variety of methods for preparing sustainable development programs is determined by users' needs for strategic information, and enterprise leaders are the main among them (Koval et al. 2020). Forecast reports reflect an administration's ideas about future enterprise operation by considering possible changes in economic, social, political, legal, and competitive conditions, and model how they will influence the key indicators of sustainable development of an industrial enterprise (Shmygol et al. 2020). Professionals involved in the preparation of information for strategic decision-making should have the basic tools to create, process, and analyze forecast reports in conditions of uncertainty. The ability to prepare projected reports and choose an optimal strategy for sustainable development for the future is the main factor in avoiding mistakes in business, and the basis for managing the financial and investment activities of an enterprise (Koval, Kovshun et al. 2019).

Results

The sustainable economic development of industrial enterprises requires the formulation of a decision-making system aimed at ensuring effective development. The formulation of such decisions requires high-quality informational support for the sustainable development of a business entity. Improving the process quality of developing strategy components is the basis for ensuring the sustainable development of economic subsystems (Yeshchenko, Koval, and Tsvirko 2019). The study of economic systems is carried out by using methods of economic analysis, which allow for the creation of an effective basis for modeling sustainable economic development at industrial enterprises (Yankovyi et al. 2019).

For forecasting, it is proposed to use the method of multiple regression, which will make it possible to identify the degree of relationship between indicators and to make predictions over time. It will also serve as the basis for monitoring the strategic climate and the strategic potential of an enterprise for readiness, and the ability of a business entity to carry out activities in compliance with the principles of sustainable development (Baklanova, Petrova, and Koval 2020).

The main criteria for selecting factors are the accuracy, reliability, and efficiency of obtaining information, as well as the ability to predict them. Based on these requirements, we have selected as result indicators (Y) the following groups of financial performance indicators to build the model, where:

EFI_1 – Total value of assets, UAH million
EFI_2 – Receivables, UAH million
EFI_3 – Accounts payable, UAH million

As internal factor indicators (X), we have selected indicators of economic activity:

EII_1 – Fixed assets, UAH million
EII_2 – Production volume, UAH million
EII_3 – Costs per 1 UAH of marketable products, kopecks
EII_4 – Net income, UAH million
SI_1 – Average number, thousand people
SI_2 – Average monthly salary, UAH
SI_3 – Productivity, UAH

Taking into account that enterprises are influenced by both internal and external factors, it is recommended that this analysis is carried out according to several external indicators (Z):

FE_1 – Prices for raw materials, UAH / unit
FE_2 – Prices of marketable products, UAH / unit
FE_3 – Export ratio, %
FE_4 – Inflation index, %

To explain the variation of effective feature y in statistical reports of the years 2004–2016 (Orekhova 2013; Schumpeter and Backhaus 2003; Danilov-Danilyan 2003), we have chosen m of factorial features

$$x_1, x_2, \dots, x_5, i = 1 \dots 5: (y_i, x_{1i}, x_{2i}, x_{3i}, x_{4i}, x_{5i}), i=1,2,\dots n.$$

The relationships between features are given by a correlation matrix consisting of paired correlation coefficients:

$$
Q_{m+1} = \begin{array}{c|cccccc}
 & y & x_1 & x_2 & x_3 & x_4 & x_5 \\
\hline
y & 1 & r_{yx_1} & r_{yx_2} & r_{yx_3} & r_{yx_4} & r_{yx_5} \\
x_1 & r_{x_1y} & 1 & r_{x_1x_2} & r_{x_1x_3} & r_{x_1x_4} & r_{x_1x_5} \\
x_2 & r_{x_2y} & r_{x_2x_1} & 1 & r_{x_2x_3} & r_{x_2x_4} & r_{x_2x_5} \\
x_3 & r_{x_3y} & r_{x_3x_1} & r_{x_3x_2} & 1 & r_{x_3x_4} & r_{x_3x_5} \\
x_4 & r_{x_4y} & r_{x_3x_1} & r_{x_4x_2} & r_{x_4x_3} & 1 & r_{x_4x_5} \\
x_5 & r_{x_5y} & r_{x_5x_1} & r_{x_5x_2} & r_{x_5x_3} & r_{x_4x_5} & 1
\end{array}
$$

It is possible to set a random paired correlation coefficient r_{yx_i}. between each pair of features (Oleinik 2000):

$$r_{yx_i} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})*(y_i - \bar{y})}{n*S_x*S_y} \qquad (1.1)$$

where $\bar{x}$, $\bar{y}$ are the average values of factorial and effective features; and S_x, S_y are the average squared deviations of factorial and effective features.

When conducting this research, we took into account that, when calculating paired correlation coefficient r_{yx_i}, all of the explained variations of effective feature *y* depend on the change of factorial feature x_i. It should be noted that this statement will be true if feature x_i does not correlate with other factorial features. However, as is noted by some scientists (Oleinik 2000), such cases in statistical practice are extremely rare and, as a rule, paired correlation coefficients between factorial features are different from zero. In this case, variation of feature *y*, found by calculating r_{yx_i} through variation of feature x_i, is actually due to the influence of several features that correlate with each other.

To identify the "pure" influence of x_i on *y*, we will conduct such a choice when all factorial features except x_i achieve fixed values. The correlation coefficient, calculated under such conditions, reflects closeness of correlation only between *y* and x_i, so that the influence of other features on *y* is excluded. This correlation coefficient is called 'sample', and is denoted as $r_{yx_i/x_1,x_2,\dots x_m}$ (Oleinik 2000; Filipishyna et al. 2018). An index before a fraction indicates a pair of features that correlate with each other, and an index after a fraction *(m-1)* indicates factorial features which get fixed values.

Sample correlation coefficients are calculated using correlation matrix Q_{m+1}, by the formula (Oleinik 2000):

$$r_{yx_i/x_1,x_2,\dots x_m} = \frac{A_{1,j+1}}{\sqrt{A_{1,1}*A_{i+1,i+1}}} \qquad (1.2)$$

where $A_{i,k}$ is an algebraic determinant of the correlation matrix element located at the intersection of the *i*-row and the *k*-column of the matrix.

Correlation coefficients between effective and factorial features are calculated when conducting research on sample statistics, therefore any statistical indicator and correlation coefficient can be defined with some error. In this regard, there is a need to verify the significance of the correlation coefficient calculated on the basis of sample data. It is known (Oleinik 2000) that a sample correlation coefficient is considered significant if conclusions about the presence and nature of correlation, made on the basis of the sample, are valid for the general population.

Testing the significance of paired correlation coefficients is carried out taking into account known criteria (Oleinik 2000): if $|t_{x_i}| > t_{K_a}$, then the correlation relationship between variables is considered significant. If $|t_{x_i}| \leq t_{K_a}$, then the difference between sample correlation coefficient r_{yx_i} and a correlation coefficient which is equal to zero is insignificant, and the difference of r_{yx_i} from zero is explained by the random nature of data selection. According to the research results, taking into account above criteria, the significance of correlation coefficients r_{yx_1}, r_{yx_2}, r_{yx_3}, r_{yx_4}, r_{yx_5} was established. Recognizing the significance of correlation coefficients, according to the accepted level of significance, it can be stated that error probability will not exceed 0.05, because the calculated values of statistics t_{xi} are higher than the critical value $t_{K,a}$.

The second test of the significance of paired correlation coefficients involves defining the critical value of correlation coefficient r_{kp}. In particular, it is known (Oleinik 2000) that the critical value of students' statistics $t_{K,a}$, corresponds to the critical value of the correlation coefficient r_{kp}:

$$t_{kp} = \frac{t_{K,a}}{\sqrt{t_{K,a}^2+K}}, \tag{1.3}$$

In the case of $|r_{yx_i}| > r_{kp}$, then the sample correlation coefficient is significant, otherwise the hypothesis of insignificance of difference between r_{yx_i} and the correlation coefficient of the general population is accepted.

We set the value of the critical correlation coefficient r_{kp}. = 0.58, depending on the number of degrees of freedom of K at the level of significance a = 0.05 (Oleinik 2000). In the second test, using comparison of the paired correlation coefficients with the critical value of the correlation coefficient, we can consider the correlation coefficients r_{yx_1}, r_{yx_2}, r_{yx_3}, r_{yx_4}, r_{yx_5} significant. We check the significance of sample correlation coefficients in the same way, but the number of degrees of freedom is defined by the formula (Oleinik 2000; Filipishyna et al. 2018):

$$K = n\text{-}m\text{-}1, \tag{1.4}$$

where n represents the number of calculated levels and m the number of feature factors.

The decision to form variety D – the great number of factorial features used to explain the effective features and build an adequate regression model – is based on the comparison of calculated feature F-inclusion with its minimum table value. If the calculated value of

F-inclusion for factorial feature x_i is higher than the minimum, then the corresponding factorial feature will be included in variety D.

It is also necessary to define the value of F-inclusion F_{yx_i}, i= 1,2,...,5 on the first row of the correlation matrix (Oleinik 2000):

$$F_{yx_i} = r_{yx_i}^2 * (n-2)/(1-r_{yx_i}^2) \quad (1.5)$$

According to the research results, it is established that each calculated value of F-inclusion is higher than the table minimum of F-inclusion. Thus, the condition $F_{yx_i} > F_{вкл}^{табл}$ is fulfilled, which allows us to draw a conclusion about the possibility of explaining the variation of effective feature y and construct an adequate mathematical model.

To form variety D, it is necessary to define the possibility of including a variety of other factorial features which are given in Table 1. For this purpose, using separate correlation coefficients we define the corresponding values of F-inclusion (Oleinik 2000):

$$F_{yx_i/x_j} = r_{yx_i/x_j}^2 * (n-3)/(1-r_{yx_i/x_j}^2) \quad (1.6)$$

The results of these calculations are given in Table 1 and Table 2.

Table 1. *Internal factors' impact on the effectiveness of the financial indicators of industrial enterprises' activity in Ukraine.*

	Solvency ratio for internal factors	Financial stability index	Ratio of debt to net worth	Debt ratio	Quick liquidity ratio	Cash ratio	Terms of receivables	Profitability of sales	Working capital return time
Rental production	0.2583	0.2543	0.277	0.4318	0.4097	0.5468	-0.387	0.6181	-0.256
Costs per UAH 1 of marketable products, kopecks	-0.548	-0.481	-0.639	-0.53	-0.456	-0.59	0.5389	-0.94	0.3848
Number	0.7614	0.7086	0.5445	0.4011	0.2643	0.5106	-0.649	0.443	-0.637
Productivity	-0.758	-0.634	-0.465	-0.261	-0.131	-0.279	0.6049	-0.236	0.6548
Average salary	-0.506	-0.353	-0.405	-0.04	0.0309	-0.139	0.4161	-0.438	0.3245
Net profit	-0.37	-0.232	-0.289	-0.053	-0.004	-0.09	0.2017	-0.313	0.1175
Receivables	-0.736	-0.535	-0.419	-0.196	-0.061	-0.255	0.8162	-0.343	0.8232
Accounts payable	-0.817	-0.603	-0.607	-0.406	-0.285	-0.342	0.6898	-0.463	0.6655

Table 2. *External factors' impact on the effectiveness of financial indicators on industrial enterprises' activity in Ukraine*

		Solvency ratio for internal factors	Finan-cial stability index	Ratio of debt to net worth	Debt ratio	Quick liquidity ratio	Cash ratio	Terms of receiva-bles	Profita-bility of sales	Working capital return time	Receiv-ables and accounts payable ratio
Prices of raw materials	Iron ore	-0.86	-0.63	-0.61	-0.22	-0.11	-0.38	0.58	-0.66	0.44	0.02
	Sintering ore	-0.87	-0.64	-0.62	-0.22	-0.10	-0.35	0.50	-0.60	0.35	-0.02
	Concentrate	-0.86	-0.63	-0.65	-0.23	-0.13	-0.35	0.46	-0.61	0.29	-0.07
	Steel pellet	-0.88	-0.59	-0.64	-0.20	-0.11	-0.31	0.46	-0.60	0.32	-0.09
	Natural gas, t/m^3	-0.90	-0.66	-0.79	-0.31	-0.19	-0.46	0.62	-0.82	0.45	-0.07
	Electric energy t/kWh	-0.88	-0.64	-0.73	-0.23	-0.11	-0.39	0.58	-0.76	0.43	-0.01
Rental prices	Domestic market	-0.87	-0.61	-0.63	-0.18	-0.07	-0.32	0.50	-0.62	0.36	-0.01
	Foreign market	-0.85	-0.58	-0.59	-0.13	-0.02	-0.29	0.50	-0.58	0.38	0.02

Based on the developed methodology of selection of the most influential factors using a step-by-step procedure, we have formed the variety from the following seven internal factorial features and four external factorial features: $D = \{EII_{2,}\ EII_{3,}\ EFI_{2,}\ EFI_{3,}\ SI_{1,}\ SI_{2,}\ SI_{3,}\ FE_{1,}\ FE_{2,}\ FE_{3,}\ FE_{4}\}$, which includes internal and external factors. For the mathematical description of an industrial enterprise's functioning, we have used indicators of the enterprise's financial stability as an effective feature. This study confirms the previous hypothesis that, at the present stage of industrial enterprises' development, the strategic climate requires constant attention and forecasting.

A methodical approach for formulating the variety of factorial features has been developed, helping to build a multifactorial regression model of an industrial enterprise's economy and to establish a relationship between indicators of financial stability and factors.

An analytical system for the support of strategic decisions is needed in order to formulate effective strategies aimed at ensuring sustainable economic development. One of such a system's components is a set of adequate mathematical models that describe the complex process of an industrial enterprise's functioning. The economic relationship between features for the general population can be described by linear or nonlinear functional dependence. To identify this relationship, a sample of volume *n* was carried out according to statistical reports of the years 2006–2012 (Schumpeter and Backhaus 2003; Danilov-Danilyan 2003; Filipishyna et al. 2018):

$$(y_i, x_{1i}, x_{2i}, x_{3i}, x_{4i}, x_{5i}),\ i=1,2,\ldots n. \tag{1.7}$$

Defining the parameters of the mathematical models is carried out using the method of least squares (Oleinik 2000).

In particular, to define the parameters of linear functional dependence:

$$y_i = a_0 + a_1 * x_{1i} + a_2 * x_{2i} + a_3 * x_{3i} + a_4 * x_{4i} + a_5 * x_{5i} \quad (1.8)$$

The practical implementation of the developed algorithm, as well as the complex testing of the obtained models' accuracies, is performed using the Excel analysis package. To assess the accuracy of the multifactorial models obtained and the economic relationships between effective features and the factors, we have used the value of residual variance (Oleinik 2000; Filipishyna et al. 2018):

$$S_{зл}^2 = \frac{\sum_{i=1}^{n}(y_i^{пч} - y_i)^2}{n-(m+1)} \quad (1.9)$$

where $y_i^{пч}$, y_i represent, respectively, the initial (empirical) and theoretical values of the effective feature;

n – amount of data in the sample;

m – number of factors;

m+1 – number of parameters in regression equation.

In order to compare and evaluate the models' accuracies, we also use a value of average approximation error (Filipishyna et al. 2018):

$$|\bar{e}| = \frac{1}{n} * \sum_{i=1}^{n} \left| \frac{y_i^{пч} - y_i}{y_i^{пч}} \right| * 100\% \quad (1.10)$$

The model for which the value of residual variance and the value of average approximation error is smaller is more accurate, because there is less scattering of effective features relative to conditional mathematical expectation.

When building a model to prevent multicollinearity, it is necessary to exclude those variables that are closely related. After determining regression coefficients, the regression equation takes the following form (Table 3).

Table 3. *Consolidated matrix of pairwise regression*

Indicator	Internal factors			External factors		
	EII2	EII3	EII4	FE1	FE3	FE4
Equity ratio		-0.76	0.76	-0.91	-0.95	-0.90
Stability ratio			0.71	-0.77	-0.82	-0.76
Sales ratio	-0.94			0.82	0.90	0.81

According to the results of the research conducted at metallurgical enterprises in the period of 2001–2018, a decision-making model for sustainable development was obtained, considering the influence of internal factors on an industrial enterprise (Chorna, Filipishyna, Nord et al. 2019; Table 4).

Table 4. *Decision-making model for sustainable development considering the influence of internal factors on an industrial enterprise*

Indicator	Model	MR	R^2
Equity ratio	$EFI1 = 1.77-0.0415EII_2-0.77EII_3-3.95SI_2 + 0.0772SI_3$	0.82	0.67
Stability ratio	$EFI2 = 25.51-1.12EII_2-14.14EII_3-113.41SI_2+ +0.22SI_3$	0.83	0.69
Sales ratio	$EFI3 = 0.0229-0.6EII_2 + 2.59EII_3 + 17.66SI_2- -0.046SI_3$	0.86	0.73

It should be noted that the introduction of these forecasting methods will contribute to the further development of the “enterprise – state” interaction system (Petrova et al. 2020). The study showed that some enterprises have had a positive impact on the implementation of measures to improve production structure, with a reduction in employee numbers. This is especially evident against the background of large, city-forming enterprises. For enterprises, this is definitely a positive factor. For regions where enterprises are located, and for the state as a whole, these are negatives. Reducing the number of employees leads to:

- the reduction of revenues in local budgets in the form of personal income tax; reduction of revenues in social funds;
- the increase of payment costs to temporarily unemployed citizens in accordance with applicable law.

Therefore, the state as a whole and local governments may increasingly face the problem of taking into account the forecast indicators of enterprises and the implementation of measures that could offset the negative social consequences of reducing the numbers of employees at enterprises.

Such measures may include:

- the creation of new jobs at the expense of state or local budgets. At the same time, it is possible to establish small separate enterprises producing consumer goods, enterprises processing industrial waste (Ciuła et al. 2019; Koval, Mikhno, Hajduga et al. 2019), enterprises providing services to population, etc.;
- the conclusion of prior agreements with enterprises regarding the creation of new jobs, including production (or the provision of services) using technology that is not traditional for these enterprises. At the same time, in order to interest enterprises in creating new jobs, investments from state or local budgets may be attracted, or tax benefits may be provided.

One positive factor for most financial indicators is the growth of rental production during this period of analysis. However, despite the fact that there is an increase in rental production and a decrease in the number of employees, labor productivity is negative. This happened due to the influence of external factors. Firstly, metal prices decreased.

The most negative effect of the decline in prices was made on the financial indicators of enterprises classified in strategic “large” and “major” groups. Most of these enterprises are part of vertically integrated financial and industrial companies. Along with the deterioration of the economic situation in the ferrous metals market, the level of sales prices for enterprises’ products has also been badly influenced by the fact that enterprises under such integration have lost their independence, including with the sales of manufactured products. Vertically integrated financial and industrial companies operating in Ukraine own the main block of shares of almost all metallurgical enterprises.

Which factors can the state use to effectively influence the activities of metallurgical enterprises under such conditions? The final result of such an impact should be the improvement of indicators and a corresponding increase in budget revenues. There can neither be any reforms, nor reprivatization, as in this case Ukraine would lose any assistance from foreign, and perhaps domestic, investors (Filipishyna et al. 2018).

One of the most effective state measures for enterprises’ activities, including within the metallurgical industry, may be the intensification of domestic market activity, including metal consumption and the improvement of market infrastructure.

State measures for the development of the domestic market and the support of domestic producers might be different, including the following:

- state orders for certain types of products or services, the production or provision of which can boost domestic market activity in general. Financing of such state orders can be provided both at the expense of budgetary funds, and on a parity basis;
- state initiation of intersectoral agreements for the production of certain types of products or goods, and state support for such production by providing soft loans with an annual rate not more than the National Bank of Ukraine refinancing rate;
- providing tax benefits for the period of preparation and development of the production of goods that are needed in the domestic market of Ukraine;
- providing changes to current tax legislation, including:
  a) a reduction of the VAT rate of not more than 10% for all products or services of an industrial purpose, and which are produced for domestic market consumption;
  b) an obligatory VAT payment within the period prescribed by law when importing groups of goods, the production of which is sufficient in the domestic market of Ukraine, into the customs territory of Ukraine;
  c) VAT charges to the customs value of exported goods, if these goods have wide domestic demand and their export causes artificial deficit.

Among external factors that affected the effectiveness of financial indicators most negatively were price increases for natural gas and electricity. A highly negative impact of these factors are not only significant price increases for these energy types, but also a high level of production energy intensity (Koval, Sribna, and Gaska 2019; Koval, Sribna, Mykolenko et al. 2019). In total, these two energy sources account for almost 20% of the total production costs of metallurgical manufacture, with natural gas alone comprising almost 12%. The energy intensity of one ton of steel production in Ukraine is 11.6% higher than the world average. Metallurgical manufacturers, as well as enterprises from other industries, face the problem of reducing production energy intensity. This is not only a factor in increasing the competitiveness of Ukrainian producers, but also in ensuring the sustainable economic development of Ukraine (Kostetska et al. 2020).

Using the methods of this methodology for assessing the impact of factors and forecasting financial results will allow the management structure of enterprises to make effective decisions on: planning production growth; the formation of the optimal number of employees; changes in the organizational structure of enterprise; changes related to restructuring (outsourcing, downsizing, etc.); planning enterprise activity considering observance, and if necessary changing it in line with the results of the dynamics of financial activity; and the formation of additional necessary funds for certain values of projected financial statements (Chorna, Filipishyna, Nord et al. 2019; Chorna, Filipishyna, Krutova et al. 2019; Luchaninova et al. 2019; Kvasha et al. 2019).

Conclusions

Strategic management decisions can change the current structure of a balance sheet radically, and lead to temporary a decrease in profitability if there is a need for technical re-equipment, research and development, etc. Forecasting based on the regulation of items is used when enterprise administration makes significant, sometimes far from optimal in a financial sense, management decisions that are strategic and might be necessary in the context of further competition.

The selection of a model of sustainable development plays an important role in defining the index of sustainable development and the classification of industrial enterprises according to the criterion of sustainability. Among the advantages of this method, it can be noted that enterprises belonging to a certain class of decisions can be considered to have the possibility of sustainable development inherent in them.

Comparison of the integrated stability of an industrial enterprise with region integrated stability in most cases coincides, which confirms the close relationship between them in terms of the directions of sustainable development. Detailed analysis of the sustainability indicator at a regional level and at the level of an industrial enterprise makes it possible to identify the weaknesses of sustainable development across the entire system.

Management needs to focus attention on these threats by constantly monitoring them and developing programs to eliminate them. Therefore, effective decision-making requires reliable information and an analytical base, as well as methods for formulating a strategy for the sustainable economic development of industrial enterprises.

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