

Effectiveness of Forecasting the Sustainable Development of the Textile Industry with Econometric Models

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Abstract

On the basis of a flexible management system, the sustainable development of textile enterprises was forecasted using econometric models, and based on the results, proposals for further development of the industry were developed.

Keywords: *Management system, textile enterprise, sustainable development, mechanism, econometric model, forecasting.*

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Introduction.

Research is being conducted to ensure the sustainable development of textile enterprises in the world, the use of cost-effective technologies, the widespread introduction of innovations, strategic development forecasting, alternative resource allocation. At the same time, areas such as balanced development of production, reduction of costs on the basis of an alternative composition of raw materials, a system of balanced indicators (BSC), achieving potential economic growth and business modeling are topical scientific issues. In this regard, one of the most pressing issues today is to ensure the sustainable development of textile enterprises through the introduction of experience gained in world practice in the practice of textile enterprises of the republic.

The textile industry plays an important role in the economy of Uzbekistan, and large-scale practical work is being carried out to attract foreign investment, introduce a quality management system and apply innovative methods for sustainable development. The new Development Strategy of Uzbekistan for 2022-2026 sets the task of "doubling the volume of textile production" [1], the successful implementation of which requires improving the management mechanisms of the textile industry based on econometric models.

Analysis of the relevant literature.

In the economic literature, the concept of "mechanism" is used in a variety of terms. Thus, to describe the activities of the enterprise, they use the concepts of "economic mechanism", "financial mechanism", "management mechanism", "economic mechanism" and others.

In these expressions, a mechanism is sometimes understood as a set of system states or a key element of development, a tool, in particular:

- "financial mechanism" (a set of financial instruments and holders) [2];
- "control mechanism" (the most effective component of the management system, which affects the factors that depend on the effectiveness of the level of control object) [3].

The category of "sustainability" has been closely studied for centuries. The first use of this category in the economy was in the second half of the 19th century - the first quarter of the 20th century, during the period of rapid development of capitalist relations in Western Europe. The theory of "Sustainability of small farms" was formed. According to this theory, a small economy had an advantage over a large economy. With the transition to machine production, the theory of "Sustainability of small farms" was replaced by the theory of "Sustainability of family farms (farms)." Establishing impact principles in international documents such as the Rio Declaration on Environment and Development [4], the Agenda for the 21st Century [5], as well as the adoption of specific issues of global importance on the basis of conventions and multilateral agreements and the ability of the system to continue to operate at the normative level within the framework of acceptance.

Sustainability requires a balance between population and available natural resources. The needs of an industry and the number of products produced in the relevant industries should be taken into account, but the needs of future generations should not be denied. Authors such as T. Malthus [6], L. Valras [10], K. Ya. Kondratev [8] and others have devoted their research to aspects of stability at this level.

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of Uzbekistan, the main focus is on strategic management [9].

Research methodology.

The research methodology is a dialectical method, and methods such as selective observation, comparison, and expert evaluation were used in the research process.

Analysis and results.

A number of factors will influence the further development of the textile industry. These include the average annual cost of fixed assets, labor productivity, the amount of total working capital, and a number of other factors. To address this issue, BETLIS TEXTIL LLC, a member of the Uztextile Industry Association, was selected. The following factors were selected to create a multifactor econometric model for the economic development of this enterprise (data for the period from 2015 to 2021): Outcome indicator - total revenue from sales of goods (works, services) of the enterprise, thousand soums - (Y), influencing factors - average annual value of fixed assets of the enterprise, thousand soums (X_1), labor productivity, thousand soums / person (X_2), the total amount of working capital, thousand soums - (X_3). Descriptive statistics on factors were first conducted when constructing a multifactor econometric model. To do this, a special econometric modeling program - Eviews 10 was used.

Descriptive statistics on factors were first conducted when constructing a multifactor econometric model. To do this, a special econometric modeling program - Eviews 10 was used [10].

The data required for the econometric analysis are given in Table 1.

Table 1. Data of the official report for 2015-2021 for the development of a multifactor econometric model of economic development of BETLIS TEXTILE LLC¹

Years	Gross income from the sale of goods (goods, works, services), thousand soums	The average annual cost of fixed assets, thousand soums	Labor productivity, thousand soums / person	Total working capital, thousand soums
	Y	X_1	X_2	X_3
2015	38964523	1294586	62546	7256844
2016	41024525	1298756	76846	7453564
2017	44073679	1317674	84526	8159881
2018	82466323	1 317 674	109372	6479353
2019	76 045 393	3216667	96996	9 316 044
2020	74 245 844	7 187 460	185615	6 449 088
2021	98 945 423	11 361 828	247363	5 492 124

The Jacques-Bera criterion is used to verify that the resulting factor obeys the law of normal distribution. This criterion is a statistical criterion that checks the errors of observations with normal distribution moments of the third moment (asymmetry) and the fourth moment (excess) to the normal distribution and and.

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In the Jacques-Bera criterion, the zero hypothesis against the hypothesis is tested, where - the coefficient of asymmetry, - the coefficient of excess.

The results obtained show that the resulting factor is subject to the normal distribution. This is confirmed by the calculated parameters and criteria, i.e., the Jacques-Bera calculated coefficient is 6,588 and its probability is less than 0,05 (prob = 0,045).

Among the factors, autocorrelation and private autocorrelation test also matched the high obtained results. That is, there is no autocorrelation in the time series studied. This is because it can be seen from all the observations that the probability value in all the residues was less than 0,05.

So, at the next stage, we will create a multi-factor econometric model based on the total revenue from sales of products (goods, works, services) LLC "BETLIS TEXTILE". In general, the multifactor econometric model looks like this:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \varepsilon, \quad (1)$$

where y is the resultant factor, -the influencing factors, - the random error.

Where, y – is the resultant factor, x_i - the influencing factors, ε - the random error.

In the multivariate econometric model (1), the “least squares method” is used to determine the unknown parameters $\beta_0, \beta_1, \beta_2, \dots, \beta_n$.

We use Eviews 10 to calculate the unknown parameters of a multifactor econometric model. The results of the calculations are given in Table 2 below.

Table 2. Calculated parameters of a multifactor econometric model Construction of an empirical model of changes in gross sales of products (goods, works, services) LLC "BETLIS TEXTILE" ²

Related variables: Y – total revenue from sales of goods (goods, works, services)				
Method: The smallest squares method				
Row: 2015-2021				
Added variables: 21				
Variable	Model coefficients	Default error	t- Student criteria	P- value
X ₁	-8,713177158	8,188972119	-6,064013533	0,365370585
X ₂	879,2879586	531,8153453	7,653370792	0,1968267
X ₃	7,86445891	8,284413497	6,949307867	0,412498838
R ² – determination coefficient		0,763505261		
Flattened R ² – determination coefficient		0,527010522		
Standard error of regression		16263680		
F – Fisher criteria		3,228		
DW-Darbin-Watson criterion		1,82356		

²Муаллиф томонидан ишлаб чиқилган

Using the Eviews program, the coefficients of the multivariate regression equation in the form of a linear relationship, as well as indicators of the importance of the regression equation and coefficients, indicate that this relationship is within the limits of the established criteria.

Using the data in Table 2, we present a mathematical view of a multifactor econometric model:

Using statistical data, we give a mathematical view of a multifactor econometric model:

$$Y = -66582668 - 8,7132 * X_1 + 879,2879 * X_2 + 7,8644 * X_3 \quad (2)$$

(88888598) (8,1889) (531,8153) (8,2844)

[-6,749] [-6,0640] [7,6533] [6,9493]

where the standard error of each factor in round brackets and the t-statistical values of each factor in square brackets.

The calculated multi-factor econometric model shows that in BETLIS TEXTIL LLC, the average annual value of fixed assets (X_1) decreased by an average of 1.0 points, while the gross revenue from sales of goods (goods, works, services) (Y) averaged 8, Leads to a decrease of 71 points. If the labor productivity index (X_2) of BETLIS TEXTILE LLC increases by an average of 1,0 points, the total revenue from the sale of goods (goods, works, services) (Y) will increase by an average of 879,2879 points.

If the total working capital of BETLIS TEXTILE LLC (X_3) increases by an average of 1,0 points, the total revenue from sales of goods (goods, works, services) will increase by an average of 7,8644 points (Y).

The calculated determination coefficient (R^2 - R-squared) is 0,7635. The fact that the flattened coefficient of determination (Adjusted R-squared) is equal to 0,5270 and that it is close to R^2 means that the model can accept values around a change in the number of influencing factors.

Fisher's F-criterion is used to check the statistical significance of the multifactor econometric model (2) or its adequacy (suitability) to the process under study. The value of Fisher's calculated F-criterion is compared to its value in the table. The table value of the F-criterion is $F_{table} = 3,112$. The calculated value of the F-criterion is $F_{account} = 3,228$ and the table value is $F_{table} = 3,112$, and since the condition $F_{account} > F_{table}$ is fulfilled, (2) the multifactor econometric model can be considered statistically significant. the gross sales revenue (Y) can be used to forecast future periods.

According to him, in the forecast of "BETLIS TEXTIL" LLC using the trend model of changes in exogenous factors under the influence of time and the forecast indicators of the resulting and influencing factors for the medium term (2022-2026) using Equation 2:

$$Y = -66582668 - 8,7132 * X_1 + 879,2879 * X_2 + 7,8644 * X_3 \quad (2)$$

- Annual average value of fixed assets - $X_1 = -2411926 + 1567076 * t$;
- Labor productivity indicator - $X_2 = 11258 + 28016 * t$;
- An indicator of the amount of total working capital - $X_3 = 8107692 - 219534 * t$.

The forecast results were calculated by substituting the values determined in $t = 8$ instead of Equation 2 (Table 3):

Table 3. Forecast of total revenue from sales of goods (goods, works, services) of "BETLIS TEXTILE" LLC in 2022 - 2026 and the factors influencing it³

Years	Gross income from the sale of goods (goods, works, services), thousand soums	The average annual cost of fixed assets, thousand soums	Labor productivity, thousand soums / person	Total working capital, thousand soums
2021 is real	98 945 423	11 361 828	247363	5 492 124
2022	102126069	10124682	235386	6351420
2023	111385488	11691758	263402	6131886
2024	120644908	13258834	291418	5912352
2025	129904327	14825910	319434	5692818
2026	139163747	16392986	347450	5473284

As a result of the implementation of the tasks set to achieve the targets and the scientific results obtained in the study, in 2026 compared to 2021, the company's total revenue from sales of goods (goods, works, services) is expected to increase 1.36 times to 139163747 thousand soums.

Conclusions and suggestions.

The lack of theoretical and practical developments adapted to the specifics of the economic activity of industrial enterprises, as well as the really applicable recommendations that allow to create an effective mechanism are the most important issues facing local enterprises. The use of econometric models in this process gives high efficiency. The practical application of methodological recommendations for the formation of a mechanism for sustainable development of textile enterprises using econometric models allows:

use of the mechanism, taking into account the specifics of the activities of any industrial enterprises;

achieving a competitive advantage due to the fact that the mechanism is based on a targeted approach, as well as the division of goals into qualitative and quantitative components;

adjustment of the mechanism of sustainable development of the organization in the economic activity of the enterprise, in the social and environmental spheres, in the event of new trends, new problems;

ability to avoid disturbances in achieving sustainable development goals;

The results of the assessment of future development opportunities on the developed econometric model will allow for the rational use of available resources.

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