



STRATEGIC ANALYSIS MODELS OF INDUSTRIAL ENTERPRISES IN THE LEAN AND BIG DATA ENVIRONMENT

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Abstract. This article explores the integration of Lean and Big Data methodologies into strategic analysis, drawing on the case of industrial enterprises in Uzbekistan. It identifies existing challenges and presents the author's proposals for addressing them. The study provides a scientifically grounded theoretical framework for evaluating the performance of joint-stock companies operating in Uzbekistan based on open-source data. Furthermore, it offers conclusions on facilitating effective managerial decision-making through the implementation of strategic analysis grounded in financial reporting indicators.

Keywords: Big data, financial reporting, integration, Lean analytics, metrics, strategic analysis.

Introduction

International and national forecasts indicate that the economy of the Republic of Uzbekistan is expected to grow by around 6 percent in the coming years. In particular, projections for 2026–2027 suggest growth rates of 6.2 and 6.1 percent in industrial production, 4.2 and 4.3 percent in agriculture, and approximately 15 percent in market services. Under such conditions of stable economic growth, the full automation of production processes and the improvement of operational efficiency through artificial intelligence technologies become key factors for sustainable development.

In this regard, the Resolution of the President of the Republic of Uzbekistan No. RP-358 dated October 14, 2024, titled “On Approval of the Strategy for the Development of Artificial Intelligence Technologies until 2030”, outlines several priority tasks. These include the creation of a national Big Data infrastructure, the introduction of artificial intelligence technologies, the automation of business processes within enterprises and organizations to ensure more efficient use of time and resources, and the expansion of artificial intelligence applications to facilitate the production of new high value-added products and services. Furthermore, the strategy emphasizes the alignment of national standards with international standards, as well as the establishment of the necessary infrastructure for training, testing, and further development of artificial intelligence models.

Within the framework of these strategic priorities, conducting strategic analysis based on Lean management principles becomes particularly relevant. Lean management approaches aim to eliminate inefficiencies and ensure that managerial decisions are made with minimal waste of resources, thereby increasing the overall effectiveness of enterprise management.



Research Methodology

The research employs a combination of legal and financial documents, as well as debates and discussions related to national and international practices. In addition, the study relies on monographic observation of existing challenges and their potential solutions. Economic and strategic analysis methods are also applied in order to evaluate the financial and operational performance of industrial enterprises and to identify opportunities for improving strategic decision-making within the Lean and Big Data environment.

Literature Review

According to Article 26 of the Law of the Republic of Uzbekistan “On Accounting”¹, the annual financial statements of business entities must be publicly accessible to interested parties, including banks, stock exchanges, investors, creditors, and other stakeholders in accordance with the legislation. At the same time, Article 28 of the same law states that confidentiality must be maintained in the accounting process, and access to accounting registers is permitted only with the authorization of the head of the accounting entity or in cases specified by law.

These provisions highlight the importance of ensuring transparency in financial reporting while simultaneously maintaining necessary confidentiality. In this context, the development of large-scale data repositories, the harmonization of national accounting standards with international standards, and the creation of artificial intelligence models for economic analysis become increasingly important.

Traditionally, the financial and economic condition of enterprises has been assessed using several key indicators, including:

- the solvency or coverage ratio (Tq);
- the coefficient of provision with working capital (At);
- the profitability ratios of assets and expenses (Ar, Xr).

In addition to these primary indicators, several supplementary indicators are also used, such as:

- the ratio of equity to short-term liabilities (O‘Q);
- the capacity utilization coefficient (Qf);
- the depreciation coefficient of fixed assets (Ek)².

These indicators are defined in the Regulation on Conducting Financial and Economic Analysis of State-Owned Enterprises, approved by Resolution No. 1013 of the Cabinet of Ministers of the Republic of Uzbekistan dated December 14, 2018.

International rating agencies also rely on similar systems of indicators when assessing corporate performance. For example, Moody’s Investors Service applies both quantitative (financial) and qualitative indicators when determining company ratings. In particular, the following key indicators are used to evaluate a company’s long-term financial sustainability³:

1. Independence (Autonomy) ratio, representing the share of equity in total assets;
2. Financial stability indicators;
3. Profitability and efficiency ratios.

¹ “On Amendments and Additions to the Law of the Republic of Uzbekistan ‘On Accounting’” (<https://lex.uz/ru/docs/-2931253>)

² “Regulation on Conducting the Analysis of the Financial and Economic Condition of Enterprises with State Participation, approved by Appendix No. 2 to Resolution No. 1013 of the Cabinet of Ministers of the Republic of Uzbekistan dated December 14, 2018.”

³ <https://www.moody.com/web/en/us/capabilities/company-reference-data/orbis.html>

In Moody’s analytical framework, particular attention is given to operating profit and the stability of this indicator, as it reflects the company’s long-term ability to maintain financial viability and sustain its operations.

Conclusion and Recommendations

The data of “Beruniy Cotton Cleaning Plant” Joint-Stock Company for the period of 2016–2025 were analyzed based on the indicators presented above. According to the results of the analysis, it was possible to determine six out of seven indicators using publicly available data. However, the financial statements did not provide sufficient information to calculate the capacity utilization coefficient.

Furthermore, the correlation relationship between the initially identified six indicators and y1- (net profit) was analyzed based on the available data (Figure 1).⁴

	<i>X 1</i>	<i>X 2</i>	<i>X 3</i>	<i>X 4</i>	<i>X 5</i>	<i>X 6</i>	<i>y 1</i>
X 1	1						
X 2	0,741745	1					
X 3	0,529769	0,430569	1				
X 4	0,057244	-0,29377	0,450696	1			
X 5	0,828187	0,833373	0,484686	-0,07006	1		
X 6	0,633051	0,754381	0,318865	-0,06844	0,717488	1	
y 1	-0,00216	-0,3395	0,449729	0,962693	-0,13042	-0,15562	1

Figure 1. Correlation relationship between net profit and the indicators of financial and economic condition analysis.

According to the results of the analysis, a strong correlation of 0.962693 was identified between net profit (*y*₁) and the return on assets coefficient (*X*₄). This indicates that as the value of this factor increases, the resulting indicator (net profit) also increases at nearly the same rate.

The relationship between the indicators and net profit can be described as follows:

- the profitability ratio of expenses (*X*₃) shows a positive correlation with net profit at the level of 0.449729;
- the coefficient of provision with own working capital (*X*₂) demonstrates an inverse relationship with net profit;
- the solvency (coverage) ratio (*X*₁), the ratio of equity to short-term liabilities (*X*₅), and the depreciation coefficient of fixed assets (*X*₆) show insignificant correlation with net profit.

When constructing the regression model (based on Figure 2), the following equation was obtained:

$$y_1 = 92602,12 - 757,577 X_1 - 22339,4 X_2 + 177388,8 X_3 + 32734058 X_4 - 542,545 X_5 - 183316 X_6$$

⁴<https://new.openinfo.uz/uz?tab=stock&page=1&org=%22Beruniy+paxta+tozalash+zavodi%22+aksiyadorlik+jamiyati&type=stocks>



Based on the financial statement indicators, a Lean analysis was conducted using the data of “Qizilqumsement” Joint-Stock Company for the period 2015–2025. According to the results of the analysis, the following findings were identified:

1. Inventory. The volume of inventories increased from 298 billion UZS to 636 billion UZS, and it is projected to reach 675 billion UZS in the following year. From a Lean management perspective, the increase in inventories indicates that a significant portion of working capital is tied up in products, which leads to higher storage and maintenance costs. However, since more than 80 percent of inventories consist of production reserves, the situation can be assessed relatively positively (Table 1).

Years	Information	Forecast	Low probability connection	Highly probable connection
2015	298 019 252,00			
2016	280 224 723,00			
2017	351 071 576,00			
2018	379 414 569,00			
2019	367 378 993,00			
2020	413 055 636,00			
2021	479 619 703,00			
2022	557 808 143,00			
2023	521 266 980,00			
2024	631 634 745,00			
2025	636 295 989,00	636 295 989,00	636 295 989,00	636 295 989,00
2026		675 898 323,65	594 353 682,45	757 442 964,86



R-squared	0,939248804
Adjusted R-squared	0,928203132
Standard Error	138346,7286
Observations	40

Analysis of Variance

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>F</i>
Regression	6	9,76512E+12	1,62752E+12	85,03319706	1,22069E-18
Residuals	33	6,31614E+11	19139817312		
Total	39	1,03967E+13			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t-Statistic</i>	<i>P</i>	<i>P-value 95%</i>	<i>High 95%</i>	<i>P-value 95,0%</i>	<i>High 95,0%</i>
y 1	92602,12195	54354,61805	1,703666133	0,09784457	-17983,17996	203187,4239	-17983,17996	203187,4239
X 1	-757,5773813	2765,629918	-0,273925798	0,785849006	-6384,293757	4869,138994	-6384,293757	4869,138994
X 2	-22339,42559	120444,0394	-0,185475559	0,853991379	-267384,6663	222705,8151	-267384,6663	222705,8151
X 3	177388,7705	121137,2097	1,464362362	0,152557197	-69066,73575	423844,2767	-69066,73575	423844,2767
X 4	32734057,83	2385329,019	13,72307869	3,4265E-15	27881069,45	37587046,21	27881069,45	37587046,21
X 5	-542,5453377	2461,753342	-0,220389804	0,826925402	-5551,020171	4465,929496	-5551,020171	4465,929496
X 6	-183316,2585	162737,4174	-1,126454269	0,268098433	-514408,0237	147775,5067	-514408,0237	147775,5067

Chart 2. Regression of net profit and financial and economic analysis indicators.

The fact that more than 80 percent⁵ of inventories are production reserves ensures that the joint-stock company will be supplied with relatively low-cost materials in the following year. Nevertheless, it is advisable to optimize the level of inventories in accordance with actual production needs in order to improve operational efficiency.

Table 1

Analysis of the composition of "Inventories"

Indicators	2015		2025	
	amount	portion, %	amount	portion, %
Inventories	298019252,00	100,000	636295989,00	100,000
Production reserves	252108577,00	84,595	391426239,00	61,516
Incomplete production	26240988,00	8,805	205841044,00	32,350
Finished product	19315200,00	6,481	39028706,00	6,134
Goods	354487,00	0,119	0,00	0,000
Future period expenses	269312,00	0,000	35108966,00	0,000

2. Accounts Receivable.

Accounts receivable increased from 57 billion UZS to 164 billion UZS, and it is projected to decrease slightly to 154 billion UZS in the following year. The analysis shows that although the company has delivered products to its customers, cash inflows have been delayed. This situation reduces the company's liquidity level and limits its ability to invest in new projects and development initiatives.

Years	Information	Forecast	Low probability connection	Highly probable connection
2015	57 267 073,00			
2016	177 407 370,00			
2017	120 301 114,00			
2018	73 910 216,00			
2019	141 083 126,00			
2020	83 184 969,00			
2021	96 800 727,00			
2022	150 143 406,00			
2023	164 040 620,00	164 040 620,00	164 040 620,00	164 040 620,00
2024		95 051 145,81	47 079 085,54	143 023 206,07
2025		183 065 910,31	135 093 634,17	231 038 186,45

⁵ <https://new.openinfo.uz/uz?tab=stock&page=1&org=%22Qizilqumsement%22+aksiyadorlik+jamiyati&type=stocks>



2026		154 129 083,33	106 156 423,42	202 101 743,24
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3. Fixed Assets. The initial value of fixed assets increased from 554 billion UZS to 3,384 billion UZS. Accordingly, the accumulated depreciation amount rose from 201 billion UZS to 1,459 billion UZS. During the analyzed period, the depreciation coefficient of fixed assets of the joint-stock company ranged between 0.4 and 0.5.

Lean analysis: The expansion of the equipment base may have contributed to an increase in production capacity. However, a depreciation coefficient at the level of 0.4–0.5 may lead to higher maintenance and servicing costs. Therefore, it is recommended to consider the acquisition of new technological equipment in order to improve the efficiency coefficient of the existing production assets.

4. Ratio of Equity to Liabilities.

Although the ratio of equity to liabilities remains positive in the joint-stock company, it also indicates a declining dependence on external debt. This indicator for “Qizilqumsement” Joint-Stock Company amounted to 10.3 in 2015 and 2.9 in 2025. According to Lean analysis, interest payments on loans represent costs that do not create additional value.

Based on the results of the strategic analysis, although the volume of assets of the joint-stock company has increased, the efficiency of resource utilization has declined. Within the framework of the Lean strategy, the primary focus should be placed on reducing inventory levels and accelerating the conversion of accounts receivable into cash flows.

The analysis of the available data indicates that the joint-stock company has followed a rapid expansion strategy. According to Big Data models, such rapid growth in assets has also increased the level of depreciation and may lead to a significant rise in maintenance and servicing costs in the future.

Intangible assets increased from 2.5 billion UZS to 8.2 billion UZS. However, from the perspective of Big Data analysis, this indicator represents a very small share of total assets, accounting for less than 0.3 percent. In our opinion, in the era of the digital economy, the joint-stock company should increase its investments in intellectual property and software development, including the creation of Big Data infrastructure.

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