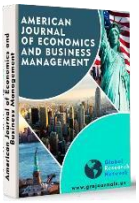

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Article

Assessing Financial Sustainability of Uzbekistan's Electricity Sector

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Abstract: This study analyzes the financial sustainability of the electricity sector in the Republic of Uzbekistan following major reforms after 2019 year, using 2029-2024 annual financial reports. The research evaluates financial performance of four companies in energy sector: "Thermal Power Plants" JSC, "National Electric Grid of Uzbekistan" JSC, "Regional Electric Networks" JSC, "Uzbekgidroenergo" JSC. For evaluation of financial sustainability was used liquidity and solvency ratio groups and classic bankruptcy models, including Altman's Z"-score and Taffler's model. Main findings reveal an unequal distribution of financial risk across the energy value chain. While generation units like "Uzbekgidroenergo" JSC maintain high solvency and stable performance and "National Electric Grid of Uzbekistan" JSC demonstrates insolvency and technical bankruptcy risks because of heavy foreign currency debt loads and regulated social tariffs.

Keywords: "Thermal Power Plants" JSC, "National Electric Grid Of Uzbekistan" JSC, "Regional Electric Networks" JSC, "Uzbekgidroenergo" JSC, Financial Sustainability, Financial Ratios, Financial Models, Liquidity, Solvency.

1. Introduction

The concept of financial stability has become a topic of serious concern for energy infrastructure globally, especially with regard to global economic uncertainty, environmental change, and increased social conflict. This concept is valid not only for companies, but also for non-profit organizations, governments and individuals, taking into account the importance of long-term financial stability to support sustainable growth. The financial stability of the enterprise is the main pillar in being able to withstand aggressive competition for enterprises in the conditions of a modern economy. Determining the essence of this concept and determining the ways to achieve, it maintains its relevance not only in economics field even more in science. In particular, as a confirmation of relevance, the number of financial stability publications indexed in the Scopus database from 2014 to 2024 amounted to 4836 documents [1].

In Uzbekistan, the electricity sector is a backbone of national economy, where maintaining financial sustainability is a primary strategic goal for ensuring continuous power supply and industrial growth.

Traditionally the concept of financial sustainability has been viewed through maximum growth rate of operating profit that a company can achieve if it maintains operational efficiency goals and financial policies without issuing new shares [2]. Some studies link financial sustainability with capital, investments and loans, highlighting

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importance of fiscal, social and environmental problems being taken into consideration [3], also market structure and independence from the actions of partners [4].

By analyzing research papers from 1970-2015 years, we found that there are 2200 empirical studies and about 90% of them confirm the existence of non-negative (positive, neutral) relationship between implementing ESG factors and financial sustainability of enterprises [5].

So, we think, financial sustainability is the ability of the state, financial system, entity to create and maintain a stable economic value in the short and long term in the process of effective management of risks and opportunities of associated with social, environmental, governance issues.

The aim of this article is to analyze financial sustainability of electricity companies in Uzbekistan after restructuration in 2019-year, using classic methods of financial measurement methods[6].

2. Methodology

The study focuses on the electricity industry of Republic of Uzbekistan. The primary research object includes four main country's electricity companies:

1. "Thermal Power Plants" JSC-the main thermal generation authority.

2. "National Electric Grid of Uzbekistan" JSC-responsible for transmission of electricity.

3. "Regional Electric Networks" JSC-responsible for distribution and retail.

4. "Uzbekgidroenergo" JSC-responsible for main hydroelectric power generation[7].

Financial sustainability of this companies is assessed through complex ratio analysis and bankruptcy prediction models. The research utilizes two distinct groups of financial indicators, liquidity, solvency, ratios to evaluate financial health of these companies. Also, in order to detect early signs of financial distress several classic models of bankruptcy, Altman's Z"-score, Taffler's model are applied.

The dataset comprises yearly financial reports of these companies from 2019-2024 years and were obtained from official web sites of this companies[8].

3. Results and Discussion

The empirical analysis began with assessment of liquidity of four electricity companies to determine short-term debt paying ability of companies in Table-1.

Table 1. Liquidity levels of energy sector enterprises from 2019 to 2024.

Ratios	2019	2020	2021	2022	2023	2024	Benchmark
"Thermal Power Plants" JSC							
Current Ratio	0.99	4.35	5.77	1.72	1.56	2.01	2.00
Cash Ratio	0.29	0.28	0.15	0.03	0.01	0.02	0.5
Net Working Capital (mln soum)	-270.00	37940	295754	5478105	5502987	6866643	-
"Uzbekgidroenergo" JSC							
Current Ratio	1.39	0.83	0.66	1.02	1.62	1.09	2.00
Cash Ratio	0.26	0.20	0.07	0.05	0.20	0.02	0.5
Net Working Capital (mln soum)	197963	-81176	-271514	16670	638938	138124	-
"National Electric Grid of Uzbekistan" JSC							
Current Ratio	0.53	0.54	0.48	0.26	0.23	-	2.00
Cash Ratio	0.02	0.06	0.01	0.01	0.01	-	0.5

Net Working Capital (mln soum)	-1497758	-2388586	-4170800	-10270640	-15633756	-	-
"Regional Electric Networks" JSC							
Current Ratio	0.21	0.75	0.57	0.60	0.30	0.48	2.00
Cash Ratio	0.08	0.52	0.30	0.11	0.02	0.06	0.5
Net Working Capital (mln soum)	-745727	-360152	-517778	-749781	-12182088	-4873317	-

Table-1 illustrates liquidity indicators of four companies from 2019-2024 years. The current ratio for "Thermal Power Plants" JSC demonstrated a steady increase from 0.09 in 2019 year to 2.01 to 2024 year with the highest 5.77 ration in 2021. The same pattern we see in "Uzbekgidroenergo" JSC's current ratio which fell in 2020 year to 0.83 and increased to 1.09 to 2024 year. However, we noticed the critical liquidity ratios in "National Electric Grid of Uzbekistan" JSC and "Regional Electric Networks" JSC performance. All companies showed critical deviation from the standard benchmark[9].

Following the assessment of short-term liquidity, the research evaluated the solvency ratio group to determine long-term financial sustainability and capital structure of these companies in Table-2.

Table 2. Solvency ratios of energy sector enterprises from 2019 to 2024.

Ratios	2019	2020	2021	2022	2023	2024	Benchmark
"Thermal Power Plants" JSC							
Equity Ratio	0.99	1.00	0.97	0.22	0.27	0.31	>0.4
Debt-to-Equity Ratio	0.01	0.003	0.03	3.53	2.69	2.22	<2.00
Interest Coverage Ratio	56.71	162.95	16.65	-8.37	2.63	0.86	3.0-4.5
"Uzbekgidroenergo" JSC							
Equity Ratio	0.66	0.63	0.63	0.63	0.62	0.64	>0.4
Debt-to-Equity Ratio	0.51	0.58	0.60	0.59	0.61	0.56	<2.00
Interest Coverage Ratio	11.87	4.50	54.94	26.52	5.54	-	3.0-4.5
"National Electric Grid of Uzbekistan" JSC							
Equity Ratio	0.19	0.20	-0.06	-0.10	-0.19	-	>0.4
Debt-to-Equity Ratio	4.26	3.88	-18.49	-11.25	-6.15	-	<2.00
Interest Coverage Ratio	2.77	2.94	-29.38	-1.96	-1.11	-	3.0-4.5
"Regional Electric Networks" JSC							
Equity Ratio	0.69	0.66	0.63	0.59	0.21	0.16	>0.4
Debt-to-Equity Ratio	0.46	0.52	0.59	0.70	3.82	5.35	<2.00
Interest Coverage Ratio	-	7.46	5.69	-0.15	-0.15	0.24	3.0-4.5

Table-2 shows solvency ratios of four electricity companies. This group of ratios provides information about financial independence and ability of managing long term liabilities. In given periods, both "Thermal Power Plants" JSC and "Uzbekgidroenergo" JSC demonstrated the strongest profile in comparison to other companies in all ratios. However, interest coverage ratio showed significant pressure falling from 56.71 in 2019 year to 0.86 in 2024 year in "Thermal Power Plants" JSC. In these terms, "Uzbekgidroenergo" JSC remained healthy at the same period. "Regional Electric Networks" JSC's interest coverage ratio maintained chronically low numbers ending 0.24 in 2024. The critical Levels of equity and interest coverage ratios were seen in "National Electric Grid of Uzbekistan" JSC during all period[10].

After analyzing liquidity and solvency ratios individually, the research applied classic bankruptcy prediction models to asses integrated probability of financial distress. The study applied Altman's Z"-score and Taffler's model to evaluate the probability of bankruptcy of these companies in Table-3.

Table 3. Assessment of the risk of bankruptcy of enterprises in the energy sector in the period 2019-2024 on the basis of the Altman Z"-score and Taffler's model.

Years	"Thermal Power Plants" JSC		"Uzbekgidroenergo" JSC		"National Electric Grid of Uzbekistan" JSC		"Regional Electric Networks" JSC	
	Altman Z"	Taffler	Altman Z"	Taffler	Altman Z"	Taffler	Altman Z"	Taffler
2019	4.35	1.10	4.25	1.09	-0.53	0.15	-	-
2020	5.7	32.75	3.32	0.77	-0.73	0.19	2.75	0.11
2021	5.19	1.13	2.98	0.46	-4.44	0.00	2.54	0.09
2022	1.8	0.05	3.59	0.73	-2.26	-0.04	2.23	0.03
2023	3.00	0.28	4.01	1.01	-2.58	-0.02	-2.35	0.15
2024	3.36	0.23	-	-	-	-	0.41	0.10
Point of risk	**<1.1**	**<0.2**	**<1.1**	**<0.2**	**<1.1**	**<0.2**	**<1.1**	**<0.2**

Table -3 shows the final phase of the analysis, models that produced divergent signals, highlighting industry paradox. All companies except "National Electric Grid of Uzbekistan" JSC showed low probability of bankruptcy in Altman's model during all period. However, Taffler's model showed more conservative results in these years. "Thermal Power Plants" JSC and "Uzbekgidroenergo" JSC mostly showed strong resilience and almost stable solvency results in observed periods. "National Electric Grid of Uzbekistan" JSC enterprise recorded the most critical result in both models showing even "technical bankruptcy". "Regional Electric Networks" JSC demonstrated downward trend confirming high-risk zone[11].

Discussion

The results of the financial sustainability of energy sector companies of Uzbekistan during 2019-2024 years showed complex interplay between ambitious infrastructure modernization and financial constraints.

The analysis of the data of primary financial statements and the coefficients presented in Table-1 shows that in the system, there are problems in all enterprises except "Thermal Power Plants" JSC on liquidity. In particular, the current liquidity ratio of the entity in 2020-2021 anomalously reached proportions of 4.35 and 5.77, and through the financial statements of the enterprise, this indicator is not at the cost of operational efficiency even more in the structure of circulating assets, that have associated with very large accounts receivable and debts to subsidiaries [12]. This is evidenced by the fact that company functioned as a "donor" during these periods. Nevertheless, although the overall

liquidity is high the absolute liquidity indicator remains very low, which evidenced by the fact that the enterprise's money is frozen in counterparties.

The next continuation of this chain is "National Electric Grid of Uzbekistan" JSC, the financial situation of which is characterized by chronic insolvency and negative working capital. When current liabilities exceed current assets in 2023, the negative balance sheet was 15.6 trillion soum. In our opinion, the enterprise is causing an increase in receivables in the presence of manufacturing enterprises, not being able to cover its debt.

The situation in our next enterprise, "Regional Electric Networks" JSC, is also demonstrating problems with liquidity. Among the indicators, there was a slight relative improvement in 2020, and even absolute liquidity reached the norm level. It is natural, that enterprise has problems with cash ratio because the enterprise has difficulties in collecting the payment for electricity from the population on time and that influence to liquidity, but this puts pressure on the payment chain in the entire energy sector.

If we analyze the indicators of "Uzbekgidroenergo" JSC, although with a negative change in indicators in 2020-2021, we can see that in the general case, the dynamics of indicators have stability compared to other enterprises.

In conclusion, we assume that enterprises have problems with liquidity, and as factors affecting it, we assume that these enterprises were formed in the near period and that the transition was carried out during these periods, the pandemic that occurred, reforms in the industry, and that indicators can seriously threaten their financial stability if they do not recover in the near future periods.

By analyzing Table-2 above, we can see fundamental differences in strategies for maintaining the solvency of the power generation, transmission and distribution chain.

In particular, in "Thermal Power Plants" JSC we can see that the dynamics of the indicators which are the classic signs of investment load, when the coefficient of interest compensation sharply deteriorated to the negative -8.37 negative value in 2022. This can be explained by the increase in financial costs associated with the provision of services to debts, which that year were attracted to the modernization of Turakorgan and Takhiyatosh stations [13]. At the same time, we can see the relative increase in debt funds to capital with the fact that the indicator of autonomy is exactly the same 2022-2023 year below the norm, and the debt burden increases.

In this landscape, the most relatively low indicators are observed in the "National Electric Grid of Uzbekistan" JSC. The negative values of private capital and the increase in debt load and even occurrence of negative balance indicate that there was a technical default. In order to determine the cause of this condition, it was found that these years in their financial statements were very significant losses. In our opinion, the enterprise has attracted long-term loans in foreign currency for the construction of trunk networks, which indicates that it will remain disadvantaged in the entire system without state support.

At the same time, "Uzbekgidroenergo" JSC shows the highest solvency compared to other enterprises. In our opinion, this is explained by the low cost of production and the conservative debt policy of the early years. The enterprise has held a debt load at an average of 0.37 during these periods, and this helps to maintain a high coefficient of interest compensation and acts as a security reserve for the enterprise.

Although the indicators of "Regional Electric Networks" JSC show stability until 2022, we can explain the sharp rise in the debt-to-capital ratio indicator to 3.82 and 5.35 in 2023-2024, and the fall of the capital indicator to 0.21 with the beginning of the phase of large-scale renewal of the distribution system and the introduction of a new ASKUE system.

Thus, the analysis of the table shows that the deterioration of solvency is not always a sign of bankruptcy and may be the result of a structural investment cycle in the industry, where, state guarantees keep the industry from risk of bankruptcy.

Reforms in the energy sector after 2019, the transition to market principles, radically changed the financial structure of the enterprise. In Table 2, the results of the Altman Z"-

score, Taffler's model show that industry enterprises are living at different level of financial risk. Of course, these indicators are not just a mathematical result of investment burden, tariff policy, also the result of currency risks.

An analysis of "Thermal Power Plants" JSC indicators shows a fall in 2022 in Altman Z" falling to 1.87 and Taffler's falling to 0.05 passing through the enterprise's classic investment shock phase. In our opinion, the main reason for this is the revaluation of assets on the basis of IFRS standards, the rapid growth of huge foreign exchange loans received for new energy blocks from operating profit. However, by 2024, all models are showing a stable security area, which, of course, indicates the launch of new capacities and an increase in operational efficiency.

The "Uzbekgidroenergo" JSC once again proves that entity has strong performance in comparison with the whole system. During the analyzed period, neither model identified the risk of bankruptcy of this enterprise. A systematic reason for this is that the operating margin is higher. This enterprise showed high financial security even during the period of investment projects

The most critical situation is observed in the "National Electric Grid of Uzbekistan" JSC. All models noticed chronic bankruptcy risk at this enterprise. The negative values of the Altman Z" score mean that the private capital of the enterprise is exhausted. It is suggested that the obligation of the enterprise to buy energy at a price and sell it cheaply in order to fit to social tariffs and influence of currency has led the enterprise to a state of distress[14].

"Regional Electric Networks" JSC indicators have deteriorated sharply in 2023, with both models (100%) in 2024 year providing a bankruptcy risk signal. An interesting paradox is emerging in this place of our study. In the analysis of the above financial indicators, most of the indicators of solvency and liquidity at this enterprise represented the moderate results, but bankruptcy models indicate probability of bankruptcy. The main reason here is that simple indicators focus on the quantity of the asset, while bankruptcy models focus on the quality of the asset and its relation to liabilities. For example, the balance sheet of an enterprise has a large amount of circulating assets which improves the Current ratio, but a large part of these assets occurred in return for receivables. For a simple indicator, this is "wealth", but for the Altman's model, this is a poor-quality asset, since they check the speed of the asset's conversion into cash and its own financing ability. If money does not come, the enterprise will remain technically insolvent. In addition, through an in-depth analysis of the balance sheet of the enterprise, we noticed that enterprise liabilities have tripled in the period 2022-2023, so Taffler's models view this rapid increase of liabilities as a violation of financial equilibrium. Although the revenue has increased, the growth rate of debt is much higher than the revenue and profit. Also, current liabilities increased faster than current assets. As a result, private working capital had a negative value. This may not be as noticeable on a simple liquidity indicator but drops the score sharply on the complex model, causing the model to show the risk of bankruptcy[15].

4. Conclusion

In conclusion, in Uzbekistan, there is unfair distribution of financial risks in the energy system. Even if the generation unit is financially healthy, transportation and distribution companies are digesting the damage and macroeconomic shocks of the entire system. This scientifically proves importance of developing mechanism for re-straining the financial margin across the chain.

Despite providing a comprehensive analysis of financial sustainability, our research had several limitations and it should be considered during interpretation.

1.Data gaps and transparency. The research was conducted on the basis of yearly financial reports which obtained from official web sites and while collecting data certain indicators were not explicitly stated in the public annual reports, so research had gaps in

creating tables with ratios. Also, all data were obtained from single reports of companies except "Uzbekgidroenergo" JSC which data was obtained from consolidated statements.

2.Application of classic models. Altman's and Taffler's models were originally created for market-driven commercial companies and their application to state owned natural monopoly companies might give insufficient results for interpretation ignoring high asset intensity and government guarantees.

3.Currency volatility and inflation. In study period Uzbekistan struggled with high fluctuations of foreign currency and inflation rate. So, this might affect to interest cover and solvency ratios and show high risk neglecting operational efficiency.

4.External shocks. The analysis period includes pandemic and post pandemic period which may create anomalies in the performance and liquidity of companies.

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