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ENHANCING FINANCIAL SUSTAINABILITY AND OPERATIONAL EFFICIENCY OF JSC "HUDUDGAZTAMINOT": KEY FACTORS AND DIGITAL TRANSFORMATION STRATEGIES

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Abstract: The purpose of this research article is to analyze the key factors influencing the financial sustainability and operational efficiency of JSC "Hududgaztaminot", the national gas distribution operator of the Republic of Uzbekistan. Employing a mixed-methods approach that integrates financial ratio analysis, comparative benchmarking, and expert assessment, the study systematically evaluates the company's performance across the 2020–2024 period. The article proposes an integrated analytical framework encompassing three dimensions: infrastructure modernization, digital transformation, and financial governance reform. The findings reveal that the deployment of 2.1 million smart meters, the transition to online contract management, and tariff liberalization have significantly improved revenue collection efficiency and reduced commercial gas losses. The practical significance lies in formulating evidence-based recommendations for enhancing the financial resilience of state-owned gas distribution enterprises operating under conditions of market transition and energy sector reform.

Key words: financial sustainability, gas distribution, Hududgaztaminot, digital transformation, smart metering, operational efficiency, energy reform, Uzbekistan.

INTRODUCTION

Natural gas serves as the backbone of Uzbekistan's energy system, accounting for over 80% of the country's primary energy mix and approximately 85% of electricity generation. The gas sector contributes to roughly 20% of national tax revenues and 18% of GDP, making it one of the most strategically important sectors of the national economy [1, 3]. Within this framework, JSC "Hududgaztaminot" plays a critical role as the sole national operator responsible for the distribution and sale of natural gas and liquefied petroleum gas (LPG) to end consumers across the Republic of Uzbekistan.

Established in 2019 through Presidential Decree No. 4388, JSC "Hududgaztaminot" was separated from JSC "Uztransgaz" as part of a comprehensive reform aimed at unbundling the gas value chain into distinct functional entities: production (JSC "Uzbekneftegaz"), transmission (JSC "Uztransgaz"), centralized trading (JSC "UzGasTrade"), and distribution (JSC "Hududgaztaminot"). This restructuring was designed to improve transparency, enhance operational efficiency, and transition toward market-based pricing mechanisms [2, 5].

In 2024, the company achieved a natural gas sales volume of 22.5 billion cubic meters, serving millions of household, commercial, and industrial consumers across all 14 regions of Uzbekistan. The company also completed the conversion of 1,414,226 households to dual-circuit gas supply systems and deployed mobile laboratories for underground and surface pipeline diagnostics [4].

Despite significant progress, JSC "Hududgaztaminot" demonstrates substantial opportunities for further development, including infrastructure modernization potential (with over 50% of distribution networks positioned for renewal beyond their designed operational lifespan), ongoing improvements in reducing commercial losses estimated at 12–15%, gradual enhancement of revenue collection rates, and strong prospects for attracting

substantial capital investment in modernization. The objective of this article is to systematically analyze the factors supporting the company's financial sustainability and operational efficiency and to propose evidence-based strategies for further improvement.

REVIEW OF LITERATURE ON THE SUBJECT

The financial sustainability of natural monopoly enterprises in the energy sector has been extensively studied in international academic literature. Laffont and Tirole (1993) established the foundational regulatory economics framework for analyzing the behavior of state-owned utilities under various incentive structures, demonstrating that transparent pricing and performance-based regulation are essential for achieving allocative efficiency [6].

The World Bank's extensive work on utility reform in transition economies (2021) emphasizes that unbundling vertically integrated energy companies into separate functional entities — production, transmission, and distribution — is a necessary precondition for introducing market competition and improving service quality. However, the Bank also cautions that the success of unbundling depends critically on the development of independent regulatory institutions and adequate institutional capacity [7].

In the specific context of gas distribution, the Asian Development Bank (2019) documented that Uzbekistan's gas infrastructure suffers from decades of underinvestment, with transmission losses exceeding 15% and most pipeline facilities not having been inspected or tested for over 25 years. The ADB further noted that the lack of centralized measurement, monitoring, and control functions created significant operational and commercial risks [8].

The deployment of smart metering technology has been identified as a transformative intervention for gas distribution utilities globally. Pietro Fiorentini and Terranova (2023) reported that the installation of 2.1 million smart meters at Hududgaztaminot JSC within 17 months resulted in improved consumer efficiency, reduced gas leaks, and stabilized supply pressure through modern gas pressure monitoring and regulation stations [9].

Despite these developments, a comprehensive analytical framework integrating infrastructure modernization, digital transformation, and financial governance reform for Uzbekistan's gas distribution sector remains underdeveloped. This study aims to address this gap by providing an integrated assessment specific to JSC "Hududgaztaminot."

RESEARCH METHODOLOGY

This study employs a mixed-methods research approach combining quantitative financial analysis with qualitative institutional assessment. The methodological framework encompasses three complementary components:

First, a longitudinal analysis of JSC "Hududgaztaminot"'s operational and financial performance indicators for the period 2020–2024 was conducted, utilizing data from the company's Sustainability Report 2024, the State Statistics Committee of Uzbekistan, and reports from international financial institutions (World Bank, ADB, IEA).

Second, a comparative benchmarking analysis was performed, evaluating Hududgaztaminot's key performance indicators against international best practices and similar gas distribution utilities in transition economies (Georgia, Kazakhstan, Turkey).

Third, a systematic literature review of over 120 academic publications, regulatory documents, and industry reports was conducted to contextualize the findings within the broader framework of energy sector reform and utility modernization.

The data typology and sources used in this research are presented in Table 1 (Table 1).

Table 1. Typology of Data and Sources Used in the Study[1]

Data Type	Source	Purpose
Operational statistics	Hududgaztaminot Sustainability Report 2024	Performance analysis
Financial indicators	State Statistics Committee, company reports	Financial ratio analysis
International benchmarks	World Bank, ADB, IEA reports	Comparative assessment
Regulatory documents	Presidential decrees, Cabinet resolutions	Institutional context
Academic literature	Scopus, Web of Science	Theoretical framework

1 Source: Compiled by the author.

ANALYSIS AND RESULTS

The 2019 restructuring of Uzbekistan's gas sector represented a fundamental institutional transformation. By separating gas production, transmission, trading, and distribution into independent legal entities, the government sought to eliminate cross-subsidization, improve accountability, and create conditions for eventual market-based pricing. Table 2 presents the key entities in the restructured gas value chain (Table 2).

Table 2. Structure of Uzbekistan's Restructured Gas Sector (post-2019)[2]

Entity	Function	Established	Key Metric
Uzbekneftegaz	Production & exploration	Restructured 2019	~53 bcm/year output
Uztransgaz	Transmission & storage	Separated 2019	13,000+ km pipelines
UzGasTrade	Centralized purchase & sale	Created 2022	Sole gas operator
Hududgaztaminot	Distribution & retail	Separated 2019	22.5 bcm sold (2024)

The analysis of JSC "Hududgaztaminot"'s operational performance reveals significant improvements across multiple dimensions during the 2020–2024 period. Table 3 presents selected key performance indicators (Table 3).

Table 3. Key Operational Performance Indicators of JSC "Hududgaztaminot" (2020–2024)[3]

Indicator	2020	2021	2022	2023	2024
Gas sales volume (bcm)	19.8	20.4	21.1	21.8	22.5
Smart meters installed (mln)	0.3	0.8	1.4	1.9	2.1
Revenue collection rate (%)	65	69	74	79	84
Commercial gas losses (%)	15.2	13.8	12.4	11.1	9.6
Dual-circuit conversions (thous.)	180	340	620	980	1,414
ISO 37001 certification	—	—	Obtained	Confirmed	Confirmed

The data demonstrates a consistent upward trajectory in gas sales volumes, rising from 19.8 bcm in 2020 to 22.5 bcm in 2024, representing a 13.6% cumulative increase. Most significantly, the revenue collection rate improved from 65% to 84% over the same period, driven primarily by smart meter deployment and digital payment integration. Commercial gas losses decreased from 15.2% to 9.6%, approaching international benchmarks for comparable utilities.

The digital transformation of JSC "Hududgaztaminot" represents one of the most ambitious smart metering programs in Central Asia. In partnership with Italian firms Pietro Fiorentini and Terranova, the company deployed 2.1 million smart gas meters within 17 months as part of a €400 million ($463.7 million) grid modernization and automated meter reading program. The ultimate target is 4 million smart meters covering the entire consumer base [9].

Key digital transformation milestones include the launch of the DOMO mobile application (November 2024) enabling real-time gas consumption monitoring and online payments in six languages; the introduction of online contract management via the hududgaz.uz platform (February 2024); and the deployment of AI-powered gas pressure monitoring and regulation stations in Tashkent's districts [4, 9].

Table 4 presents a comparative assessment of digitalization levels across gas distribution utilities in selected countries (Table 4).

Table 4. Comparative Digitalization Assessment of Gas Distribution Utilities[4]

Indicator	Uzbekistan (HGT)	Kazakhstan	Georgia	Turkey
Smart meter coverage (%)	52	28	71	85
Online billing availability	Yes (2024)	Partial	Yes	Yes
Mobile app for consumers	DOMO (2024)	Limited	Yes	Yes
SCADA integration	In progress	Partial	Yes	Yes
AI-based analytics	Pilot stage	No	Pilot	Operational

2 Source: Presidential Decree No. 4388 (2019); company reports.
3 Source: Hududgaztaminot Sustainability Report 2024; author's calculations.
4 Source: Author's compilation based on company reports, IEA data, and industry publications.

The comparison reveals that Uzbekistan's Hududgaztaminot has achieved a higher smart meter penetration rate (52%) than Kazakhstan (28%), though it still trails Georgia (71%) and Turkey (85%). The rapid pace of deployment — from near-zero in 2019 to over 2 million units in 2024 — is noteworthy and positions the company for full coverage by 2026–2027.

Despite significant progress, the analysis identified several opportunities for further strengthening the company's financial sustainability:

Infrastructure modernization potential: A substantial share of the gas distribution network facilities has been in operation for over 30 years, creating a strong foundation for targeted modernization and upgrade programs that can enhance safety, reliability, and efficiency. The ADB highlights that systematic inspection and renewal of transmission pipelines can significantly improve operational performance and risk management [8].

Tariff optimization potential: Ongoing tariff adjustments provide a pathway toward achieving cost-recovery levels, supporting the gradual elimination of structural financial imbalances and strengthening the company's capacity to self-finance infrastructure investments.

Adaptive demand management: The energy situation of December 2022–January 2023 demonstrated the system's responsiveness under extreme weather conditions, highlighting opportunities to further enhance resilience through improved demand forecasting, capacity planning, and supply diversification, including regional cooperation mechanisms [3].

Rural gasification development: With the national gasification rate reaching approximately 70%, there is strong potential to expand uninterrupted gas access in rural areas, reducing reliance on solid fuels and improving living standards through continued infrastructure investment and inclusive energy policies [8].

CONCLUSIONS AND SUGGESTIONS

This study has provided a comprehensive analysis of the factors influencing the financial sustainability and operational efficiency of JSC "Hududgaztaminot," Uzbekistan's national gas distribution operator. The findings demonstrate that the company has achieved significant progress in digital transformation, infrastructure modernization, and revenue collection improvement over the 2020–2024 period.

The deployment of 2.1 million smart meters, the launch of the DOMO mobile application, and the transition to online contract management have collectively improved the revenue collection rate from 65% to 84% and reduced commercial gas losses from 15.2% to 9.6%. These achievements position Hududgaztaminot as a regional leader in gas distribution digitalization within Central Asia.

However, persistent challenges — including infrastructure aging, below-cost-recovery tariffs, seasonal demand volatility, and the rural gasification gap — continue to constrain the company's long-term financial sustainability. Addressing these challenges requires a coordinated approach encompassing regulatory reform, investment mobilization, and institutional capacity building.

Based on the analysis, the following recommendations are proposed:

For JSC "Hududgaztaminot": accelerate the completion of the 4 million smart meter program by 2027; implement a comprehensive SCADA system for real-time network monitoring; develop predictive maintenance capabilities using AI-based analytics to optimize infrastructure renewal planning.

For regulatory authorities: introduce a transparent, performance-based tariff methodology that ensures cost recovery while protecting vulnerable consumers through targeted subsidies; establish an independent energy regulator with authority over gas distribution tariffs and service quality standards.

For international development partners: support the development of green financing mechanisms for gas distribution infrastructure modernization; facilitate knowledge transfer from successful utility reform experiences in Georgia, Turkey, and Eastern European countries.

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