



Determining the Level of Efficiency of Gas Distribution Enterprises in the Western Region of Ukraine

*Dariusz SALA*¹⁾, *Kostiantyn PAVLOV*²⁾, *Olena PAVLOVA*⁵⁾,
*Roman DYCHKOVSKIY*⁶⁾, *Vladyslav RUSKYKH*³⁾, *Sergiy PYSANKO*⁴⁾

¹⁾ AGH University of Krakow, Faculty of Management, Krakow, Poland; ORCID: <https://orcid.org/0000-0003-1246-2045>

²⁾ Lesya Ukrainka Volyn National University Department of Economics, Entrepreneurship and Marketing, Lutsk, Ukraine; ORCID: <https://orcid.org/0000-0003-2583-9593>

³⁾ Dnipro University of Technology, Department of Mining Engineering & Education, Dnipro, Ukraine; ORCID: <https://orcid.org/0000-0002-5615-2797>

⁴⁾ Ukrenergy Holding Ltd, Zaporizhzhia, Ukraine; ORCID: <https://orcid.org/0009-0003-3335-0445>

⁵⁾ Lesya Ukrainka Volyn National University Department of Economics, Entrepreneurship and Marketing, Lutsk, Ukraine; ORCID: <https://orcid.org/0000-0002-8696-5641>

⁶⁾ AGH University of Krakow, Faculty of Management, Krakow, Poland; ORCID: <https://orcid.org/0000-0002-3143-8940>

<http://doi.org/10.29227/IM-2023-02-64>

Submission date: 01-11-2023 | Review date: 23-11-2023

Abstract

This article analyses the current situation and processes of structural transformations in Ukraine's natural gas sector, particularly in its western region. The constant existence of violations of the market balance between supply and demand has necessitated reforms in the gas sector of Ukraine and its regions. From the standpoint of the unconditional importance of gas distribution companies in the structure formation and functioning of the gas sector of the state, the relevance of the proper functioning of natural gas distribution networks among consumers in times of war and political and economic crises will help reduce the level of potential risks, as well as ensure the integrity of the liberalized natural gas distribution system as a whole. The methods implemented in the process of analysing the level of efficiency of regional gas distribution systems include the methodology of expert assessments, which allowed for a generalized assessment of the expected results, contributed to the unification of existing approaches that reflect the level of economic and market efficiency, innovation activity, and financial stability of gas distribution companies. During the study, it was possible to identify the level of need for comprehensive measures, including several actions-analysis of the institutional environment of the Western Ukrainian natural gas distribution market, which includes the following joint stock companies: "Volynhaz", "Rivnehaz", "Ivano-Frankivskhaz", "Ternopilhaz", "Lvivhaz", "Zakarpahaz", "Hemlnytskhaz", "Chernivtsihaz". As a result of the study, it was possible to find out that the level of supply from Western Ukrainian gas distribution companies is regularly changing; Joint stock company "Zakarpahaz" can be considered the most promising and competitive; at the same time, Joint-stock company "Ternopilhaz" is characterized by the lowest level of its professional activity.

Keywords: gas distribution, management of gas distribution enterprises, economic and business indicators of efficiency, distribution efficiency, western Ukraine

1. Introduction

The national gas environment has been undergoing systemic structural transformation processes in the last two decades. Chronic imbalances between the supply of gas resources and the decline in aggregate demand that had been maturing for a long time and came to the surface have generated the reforming of the gas market within the regional structural units. From the viewpoint of the importance of functioning of the gas distribution network entities that are operating in total instability and political-economic crises, the institutional order will help to reduce the level of imbalance on the regional gas market, predict retrospective institutional development in the long run, foster investment, and promote integrity and accessibility of liberalized gas distribution system of the region in general.

Functional problems with regional gas distribution markets have been the subject of domestic and foreign research for a long time. Namely, such researchers as S. Hrubyak, M. Korotia, N. Linchvska, O. Pavlova, and K. Pavlov [1–3] have contributed significantly to the development of theoretical and practical aspects of regional gas distribution markets.

Innovative issues of development at the gas distribution companies in the context of their competitiveness increase are addressed in the studies of M. Korotia, V. Kupchak, O. Novosad, O. Shandrivska, L. Horal, S. Korol, O. Dzyoba [4–6]. One way to assess competitiveness is by analyzing the market share of each gas distribution company in Western Ukraine. A higher market share generally indicates a more competitive position. [5, 7, 8]. It is necessary to note, that Ukraine has significant renewable energy potential, particularly in solar, wind, and biomass resources. The South-Eastern region is known for its favorable conditions for solar and wind energy production. [8, 9]. However, withdrawal the fossil power generating sources is impossible [10, 11]. It is necessary to use different technical and technological approaches to the management of non-renewable energy sources and do it at an economically feasible level [12, 13].

Institutional aspects of entrepreneurship development in gas distribution enterprises refer to the various structures, policies, and support mechanisms put in place by governments, organizations, and societies to foster and encourage

Tab. 1. Relative indicators of assessment of property status and efficiency of property use for the gas distribution companies in the Western Region of Ukraine, 2017–2021

Tab. 1. Względne wskaźniki oceny stanu nieruchomości i efektywności wykorzystania nieruchomości dla spółek dystrybucji gazu w zachodnim regionie Ukrainy, 2017–2021

Year	Regional gas distribution network operator	Fixed assets operability ratio (Rfao)	Fixed assets depreciation ratio (Rfad)	Mobility rate (Rmob)	Capital and current assets ratio (Rcca)	Capital productivity (CapProd)	Capital intensity (CapInt)	Capital-labor ratio (Rcl)
2017	AT 'Volynhaz'	0,532	0,388	0,566	0,884	1,379	0,500	191,325
2018		0,729	0,421	0,822	3,147	6,093	0,176	327,245
2019		0,554	0,341	0,635	2,267	5,779	0,206	261,763
2020		0,640	0,433	0,499	1,172	4,588	0,199	237,422
2021		0,648	0,385	0,469	1,269	3,694	0,213	307,122
2017	AT 'Zakarpazhaz'	0,586	0,418	0,580	1,751	6,139	0,143	151,978
2018		0,513	0,477	0,924	4,177	11,670	0,106	210,741
2019		0,577	0,379	0,876	2,872	1,283	0,768	179,692
2020		0,477	0,473	0,646	1,588	1,513	0,736	172,472
2021		0,439	0,459	0,672	1,758	0,997	0,779	276,081
2017	AT 'Ivano-Frankivskhaz'	0,464	0,424	0,611	2,189	5,128	0,252	100,124
2018		0,502	0,399	0,854	5,316	9,090	0,120	87,917
2019		0,583	0,549	0,401	1,119	1,800	0,741	76,128
2020		0,515	0,427	0,179	0,249	1,566	0,704	169,812
2021		0,571	0,514	0,313	0,328	1,040	0,660	173,979
2017	AT 'Lvivhaz'	0,639	0,498	0,708	1,600	3,322	0,223	178,508
2018		0,476	0,436	0,849	3,329	7,333	0,116	197,298
2019		0,507	0,000	0,878	4,354	10,163	0,099	175,144
2020		0,528	0,000	0,783	2,363	8,190	0,111	218,926
2021		0,584	0,560	0,636	2,507	6,388	0,186	264,870
2017	AT 'Rivnehaz'	0,540	0,387	0,622	1,835	3,797	0,229	175,693
2018		0,480	0,396	0,816	3,156	7,955	0,139	171,319
2019		0,626	0,462	0,893	3,309	7,439	0,109	180,403
2020		0,462	0,471	0,714	1,659	6,369	0,112	163,816
2021		0,529	0,537	0,493	1,331	4,372	0,196	271,208
2017	AT 'Ternopilhaz'	0,489	0,419	0,337	0,585	3,507	0,307	105,055
2018		0,623	0,394	0,392	0,854	1,564	0,556	138,425
2019		0,465	0,480	0,407	0,984	1,518	0,537	133,446
2020		0,634	0,548	0,273	0,516	1,444	0,622	139,865
2021		0,512	0,412	0,359	0,728	1,032	0,964	159,358
2017	AT 'Hmelnytskshaz'	0,741	0,341	0,579	1,161	2,688	0,368	167,643
2018		0,561	0,382	0,831	1,989	6,121	0,210	265,253
2019		0,763	0,419	0,298	0,503	4,732	0,195	238,960
2020		0,511	0,348	0,503	1,510	4,899	0,206	247,303
2021		0,600	0,410	0,479	0,996	3,705	0,241	282,562
2017	AT 'Chernivsihaz'	0,531	0,430	0,606	1,487	3,972	0,305	216,668
2018		0,666	0,468	0,750	3,101	5,930	0,129	198,118
2019		0,648	0,425	0,271	0,563	6,626	0,142	223,456
2020		0,468	0,430	0,322	0,490	6,438	0,150	202,141
2021		0,586	0,558	0,379	0,452	6,445	0,186	195,678

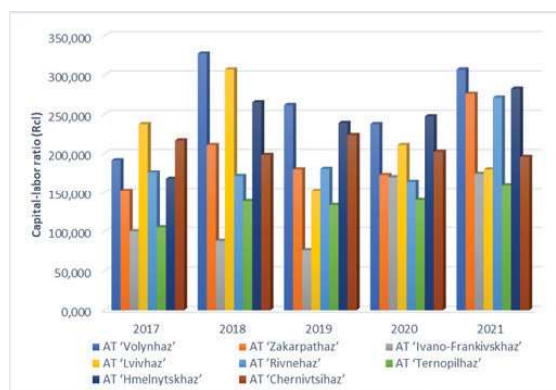


Fig. 1. Capital-labor ratio (Rcl) in years 2017–2021

Rys. 1. Stosunek kapitału do pracy (Rcl) w latach 2017–2021

entrepreneurial activities. These institutional aspects play a crucial role in shaping the environment within which entrepreneurs operate and can significantly impact the success and growth of entrepreneurial ventures. [12-14].

Meanwhile, the gap in a scientific and practical combination of institutional theory with practical terms of modernization of the gas distribution companies in the Western Region of Ukraine (GDCWRU) hasn't been eliminated yet. Ultimately, the hypothesis of stimulating the institutions of the gas distribution networks in the Western Region that generate the respective gas distribution environment should be developed, blending fragmentation and implementation of classical market theories on the systemic meso-economic level. The efficiency, reliability, and security of gas distribution will depend on that.

2. Theoretical background

Present conditions of market enhancement are characterized by the planned and intersectoral instability and they form the projected scenario of activity of the gas distribution companies in the region.

The dynamics of economic processes and their efficiency plays a crucial role in the implementation of the gas distribution companies' development strategy and the generation of their innovative and competitive ability. In a certain manner, it creates the framework for the efficient activity of regional gas distribution companies in the Western Region and is the mandatory basis for the most efficient institutional plane of their functioning [15-16].

The methods stipulating the methodologies of expert assessments that show the grounds for subjective evaluation and expected positive results constitute the dominant

Tab. 2. Relative indicators of the analysis of the gas distribution companies' liquidity in the Western region of Ukraine in 2017–2021

Tab. 2. Względne wskaźniki analizy płynności spółek dystrybucji gazu w zachodnim regionie Ukrainy w latach 2017–2021

Year	Regional gas distribution network operator	Current ratio (Rcurrent)	Quick ratio (Rquick)	Cash ratio (Rcash)
2017	AT 'Volynhaz'	0,676	0,673	0,012
2018		0,841	0,840	0,013
2019		0,709	0,704	0,007
2020		0,425	0,409	0,010
2021		0,354	0,348	0,023
2017	AT 'Zakarpathaz'	0,939	0,796	0,021
2018		0,358	0,326	0,013
2019		0,267	0,265	0,009
2020		0,567	0,555	0,031
2021		0,367	0,361	0,010
2017	AT 'Ivano-Frankivskhaz'	0,837	0,828	0,021
2018		0,903	0,872	0,076
2019		0,706	0,611	0,032
2020		0,230	0,194	0,037
2021		0,182	0,159	0,017
2017	AT 'Lvivhaz'	0,940	0,868	0,057
2018		0,921	0,890	0,015
2019		0,781	0,775	0,009
2020		0,490	0,477	0,009
2021		0,442	0,422	0,030
2017	AT 'Rivnehaz'	0,872	0,888	0,046
2018		0,903	0,884	0,030
2019		0,871	0,873	0,010
2020		0,589	0,596	0,029
2021		0,425	0,459	0,030
2017	AT 'Ternopilhaz'	0,527	0,459	0,010
2018		0,567	0,526	0,006
2019		0,553	0,515	0,008
2020		0,281	0,238	0,009
2021		0,234	0,169	0,006
2017	AT 'Hmelnytskhaz'	1,003	0,985	0,025
2018		0,967	0,919	0,036
2019		0,894	0,877	0,056
2020		0,583	0,585	0,013
2021		0,407	0,407	0,026
2017	AT 'Chernivtsihaz'	0,514	0,515	0,046
2018		0,700	0,706	0,031
2019		0,248	0,227	0,005
2020		0,164	0,138	0,012
2021		0,134	0,120	0,010

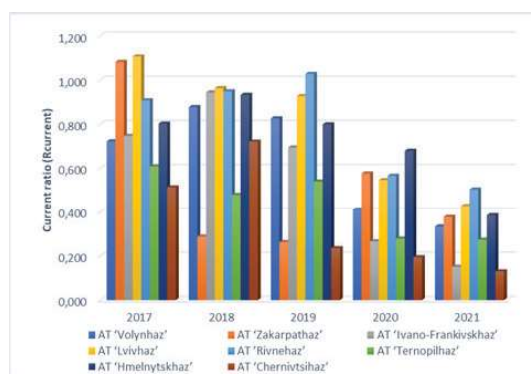


Fig. 2. Cash ratio (Rcash) in years 2017–2021

Rys. 2. Wskaźnik gotówki (Rcash) w latach 2017–2021

ing approach in the analysis of performance of the regional natural gas distribution markets [16, 17]. By using Monte Carlo simulation and forming theorems of data analyses, decision-makers in the natural gas industry can gain a better understanding of the uncertainties involved and make more informed and robust decisions regarding exploration, production, pricing, investment, and environmental planning [18, 19]. Important part of the natural gas management is also comparison of its processing with syn-gas. Gasification converts solid carbon-based materials into syngas, while natural gas distribution involves transporting and delivering natural gas to end-users for various energy applications. Both processes play vital roles in the overall energy supply chain and contribute to meeting global energy needs [20, 21]. The syn gas is the transforming the solid state of coal to gaseous state. Both natural gas processing and hard coal processing are essential for ensuring the supply of usable energy sources. Natural gas processing helps

remove impurities to meet safety and quality standards, while hard coal processing enhances the energy content and reduces environmental impacts associated with coal combustion [22].

Consistent competitive escalations on national and regional markets of natural gas distribution continuously increase the level of innovative activity of the gas distribution companies and digital transformation and foster the improvement of political resilience against domestic and external threats, thus securing the highest efficiency level of the institutional environment they operate in [23].

Existing methodological approaches to determining the rate of performance and innovative activity of companies and organizations offered by prominent researchers have promoted the unification of approaches that represent the objective level of economic activity, financial resilience of a company, and its innovative activity [24, 25].

Tab. 3. Relative indicators of the gas distribution companies' profitability in the Western Region of Ukraine in 2017–2021

Tab. 3. Względne wskaźniki rentowności spółek dystrybucji gazu w zachodnim regionie Ukrainy w latach 2017–2021

Year	Regional gas distribution network operator	Return on assets	Return on equity	Return on sales	Return on margin	Capital payback period	Equity payback period
2017	AT 'Volynhaz'	-0.154	-90,687	0.145	-0.164	-6,491	-0.011
2018		-0.003	-0.351	0.037	-0.003	-297,226	-2.852
2019		-0.134	0.897	0.012	-0.090	-7,444	1,115
2020		-0.284	0.574	-0.057	-0.137	-3,522	1,744
2021		-0.135	0.199	-0.100	-0.071	-7,413	5,017
2017	AT 'Zakarpathaz'	-0.199	-1,203	-0.081	-0.122	-5,032	-0.831
2018		-0.015	-0.146	0.045	-0.025	-66,436	-6.831
2019		-0.001	0.021	0.051	-0.017	-709,267	47,958
2020		-0.457	1.605	-1.110	-0.511	-2,188	0,623
2021		-0.666	0,714	-1,402	-0.790	-1,501	1,401
2017	AT 'Ivano-Frankivskhaz'	-0.199	-1,203	-0.081	-0.122	-5,032	-0.831
2018		-0.015	-0.146	0.045	-0.025	-66,436	-6.831
2019		-0.001	0.021	0.051	-0.017	-709,267	47,958
2020		-0.457	1.605	-1.110	-0.511	-2,188	0,623
2021		-0.666	0,714	-1,402	-0.790	-1,501	1,401
2017	AT 'Lvivhaz'	-0.125	-1,228	-0.072	-0.090	-8,029	-0.814
2018		0.000	0,000	0,046	0,000	545,235	33,027
2019		-0.030	-0,154	0,015	-0,043	-32,842	-6,505
2020		-0.409	2,905	-0,270	-0,321	-2,448	0,344
2021		-0.631	0,840	-0,696	-0,478	-1,584	1,191
2017	AT 'Rivnehaz'	-0.112	-1,017	-0,101	-0,083	-8,918	-0,983
2018		-0.008	-0,160	0,040	-0,006	-122,283	-6,235
2019		-0.037	-2,992	0,013	-0,027	-26,791	-0,334
2020		-0.255	1,107	-0,046	-0,106	-3,924	0,904
2021		-0.212	0,451	-0,037	-0,097	-4,723	2,217
2017	AT 'Ternopilhaz'	-0.113	-0,331	-0,007	-0,059	-8,885	-3,017
2018		-0.126	-0,794	-0,039	-0,131	-7,962	-1,260
2019		-0.053	-0,495	0,027	-0,063	-18,885	-2,018
2020		-0.402	2,446	-0,284	-0,386	-2,489	0,409
2021		-0.734	0,803	-1,031	-0,606	-1,363	1,246
2017	AT 'Hmelnytskhas'	-0.03	-0,08	-0,03	-0,03	-29,02	-12,93
2018		-0.01	-0,04	0,05	0,00	-187,52	-25,87
2019		-0.21	-0,68	0,02	-0,06	-4,72	-1,48
2020		-0.25	1,40	-0,03	-0,12	-4,08	0,72
2021		-0.22	0,54	-0,10	-0,12	-4,49	1,86
2017	AT 'Chernivtsihaz'	-0.221	1,370	-0,092	-0,136	-4,532	0,730
2018		-0.029	0,232	0,017	-0,019	-34,241	4,308
2019		0,491	-1,123	-0,005	0,101	2,037	-0,890
2020		0,961	-1,042	-0,069	0,182	1,040	-0,959
2021		-0.955	0,565	-0,255	-0,244	-1,047	1,771

3. Research objective, methodology and data

In the course of our scientific research, we have detected the need to implement the complex approach of a range of measures with further orientation on foreign and domestic approaches to the analysis of the institutional environment of the Western regional market of natural gas distribution and eight gas distribution network operators functioning on it, including [26–29]:

AT 'Volynhaz' – 7 customer service centers (CSCs) located in Lutsk, Kovel, Kamin-Kashyrskiy, Volodymyr Volynskiy, Ratne, Kivertsi, Horohiv;

AT 'Rivnehaz' – 6 CSCs located in Rivne, Zdolbuniv, Sarny, Dubno, Berezne, Kostopil;

AT 'Ivano-Frankivskhaz' – 6 CSCs located in Ivano-Frankivsk, Kalush, Kolomyia, Nadvirna, Dolyna, Snyatyn;

AT 'Ternopilhaz' – noCSCs;

AT 'Lvivhaz' – 5 CSCs located in Lviv, Sambir, Czervonohrad, Stryi, Pustomyty;

AT 'Zakarpathaz' – 4 CSCs located in Uzhorod, Mukachevo, Hust, Svalyava;

AT 'Hmelnytskhas' – 11 CSCs located in Hmelnytskyi, Kamyanets-Podilskyi, Slavuta, Volochysk, Izyaslav, Krasyliv, Starokostyantyniv, Bilohirya, Horodok, Polonne, Yarmolyntsi;

AT 'Chernivtsihaz' – 3 CSCs located in Chernivtsi, Kitsman, Sokyryany.

It is worth considering the fact that the markets of the natural gas distribution in Ukraine and its regions are formed on market monopoly grounds controlled directly by the National Commission for State Regulation of Energy and Public Utilities (NKREKP). Its competencies sometimes fail to meet the corporate policy of avoiding the threats of sectoral functioning. Therefore, the issue should be addressed in more detail based on the researched parameters, including [30, 31]:

Relative indicators of assessment of a company's property status and efficiency of the property use. This group includes 7 main coefficients. Their main characteristics are outlined below [32]:

– fixed assets operability ratio (R_{fao}) is intended to detect the share of fixed assets suitable for exploitation, which directly impacts the gas distribution company's performance. It is calculated the following way:

$$R_{fao} = \frac{\text{Residual value of fixed assets}}{\text{Original cost of fixed assets}}, \quad (1)$$

– fixed assets depreciation ratio (R_{fad}). It shows the cost of fixed assets written off as operating expenditures in previous periods. Meanwhile, the growing depreciation rate is a negative trend because the rate <0.5 is considered optimal. It is calculated the following way:

$$R_{fad} = \frac{\text{Fixed assets depreciation}}{\text{Original cost of fixed assets}}, \quad (2)$$

– mobility ratio (R_{mob}). It indicates how quickly a company can change the structure of its assets not losing their cost. The higher is the rate the better is the situation for the company. It is calculated the following way:

$$R_{mob} = \frac{\text{Current assets}}{\text{Assets}}, \quad (3)$$

– capital and current assets ratio (R_{cca}). It characterizes the level of a company's accounting liquidity that directly impacts its performance. It is calculated the following way:

$$R_{cca} = \frac{\text{Current assets}}{\text{Capital assets}}, \quad (4)$$

– capital productivity ($CapProd$) describes the level of business activity of a company in the context of fixed assets

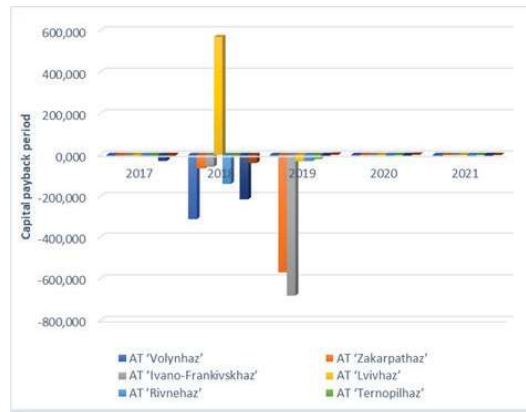


Fig. 3. Capital payback period in years 2017–2017

Rys. 3. Okres zwrotu kapitału w latach 2017–2017

use efficiency. To put it differently, the rate determines the volume of services granted per monetary unit (hryvnya) of financial resources invested in fixed assets. Regarding the standard value, there is no specific figure, 'yet, the rate should be compared to those of the competitors' [33].

$$CapProd = \frac{Net\ sales}{Residual\ value\ of\ fixed\ assets}, \quad (5)$$

– capital intensity (CapInt) is the reverse indicator to capital productivity that shows the amount of fixed assets spent per unit of output/provided services. Meanwhile, the trend towards the decrease in the coefficient value is considered positive. It is calculated the following way:

$$CapInt = \frac{Residual\ value\ of\ fixed\ assets}{Net\ sales}, \quad (6)$$

– capital-labor ratio (Rcl). It characterizes the cost of fixed production assets per employee at the company. Basically, it is the indicator of fixed assets use efficiency that determines the level of labor equipment with fixed production assets. It is calculated the following way:

$$Rcl = \frac{Residual\ value\ of\ fixed\ assets}{Average\ number\ of\ regular\ employees}, \quad (7)$$

Relative indicators of analysis of a company's liquidity.

This group of indicators demonstrates the ability of a gas distribution company to quickly convert assets to money. They include the quick ratio (Rquick), current ratio (Rcurrent), and cash ratio (Rcash).

– quick ratio (Rquick). This indicator characterizes the possibility to cover the liabilities of a gas distribution company by liquid assets. The optimal coefficient value ranges within 0.7–1.

$$Rquick = \frac{Cash + current\ financial\ investment + promissory\ notes\ received + accounts\ receivable}{Current\ liabilities}, \quad (8)$$

– current ratio (Rcurrent). It is the indicator of a company's financial capacity to cover its current liabilities by current assets. Therefore, the main designation of this indicator is to demonstrate the availability of hryvnyas of current assets per each monetary unit of current liabilities. The standard value of this indicator should be 1–3.

$$Rcurrent = \frac{Current\ assets + Capital\ assets\ for\ sale}{Current\ liabilities}, \quad (9)$$

– cash ratio (Rcash). It provides an overall assessment of assets liquidity, showing what share of current liabilities a company can cover by the realization of its entire current assets, including inventories.

The coefficient within 0.1–0.2 is the standard value. A low value of the coefficient proves that a company fails to promptly repay debts if necessary. Meanwhile, high value testifies to the problems in the company and is an indicator of an inefficient strategy of financial resources management. The indicator is calculated the following way:

$$Rcash = \frac{Cash + Current\ financial\ investment}{Current\ liabilities}, \quad (10)$$

Relative indicators of a company's profitability.

Profitability is the main indicator of a company's performance because it shows the level of return on assets and equity use. It is worth singling out the following profitability indicators:

– return on assets (ROA). The indicator shows the income per hryvnya of assets. There is no standard value but the higher is the rate the better a gas distribution company manages its assets:

$$ROA = \frac{Net\ income}{Total\ assets}, \quad (11)$$

– return on equity (ROE). The coefficient shows how much hryvnyas of profits brings one hryvnya of equity. It is calculated the following way:

$$ROE = \frac{Net\ income}{Equity}, \quad (12)$$

– return on sales (ROS). The indicator helps to assess the efficiency of services and output realization by gas distribution companies. The higher is the rate the more successful is the company in its activity. It is calculated the following way:

$$ROS = \frac{Gross\ profit}{Revenues}, \quad (13)$$

– return on margin (ROM). It describes the ratio of profits from sales of output/provision of services of the gas distribution companies against the incurred production costs. A higher value of the indicator is positive for a company:

$$ROM = \frac{Gross\ profit}{Cost\ of\ goods\ sold}, \quad (14)$$

Tab. 4. Relative indicators of business activity of the gas distribution companies in the Western Region of Ukraine in 2017–2021

Tab. 4. Względne wskaźniki działalności spółek dystrybucji gazu w zachodnim regionie Ukrainy w latach 2017–2021

Year	Regional gas distribution network operator	Total asset turnover ratio (ATR)	Equity turnover ratio	Current asset turnover ratio	Receivables turnover ratio (RTR)	Accounts payable turnover ratio (ARTR)
2017	AT 'Volynhaz'	0.816	480.127	1.609	1.643	1.268
2018		1.325	138.047	1.801	1.831	1.466
2019		1.507	-10,058	2.110	2.146	1.487
2020		1.963	-3,964	3.351	3.571	1.518
2021		1.717	-2,537	3.258	3.544	1.282
2017	AT 'Zakarpazhaz'	1.509	9.136	2.262	2.741	2.323
2018		0.632	6.146	2.049	2.343	0.703
2019		0.088	-1,308	0.320	0.332	0.081
2020		0.424	-1,487	0.661	0.715	0.803
2021		0.351	-0,376	0.535	0.558	0.477
2017	AT 'Ivano-Frankivskhaz'	1.289	12.707	1.819	1.887	1.658
2018		1.581	26.097	1.933	2.196	1.684
2019		0.717	3.619	1.466	1.789	1.065
2020		1.004	-7,137	4.491	6.604	1.388
2021		0.778	-1,035	2.681	3.424	0.859
2017	AT 'Lvivhaz'	1.310	5.588	1.976	2.291	2.007
2018		1.408	13.698	1.773	1.866	1.566
2019		1.513	-22,375	1.868	1.905	1.439
2020		2.128	-4,037	2.920	3.063	1.496
2021		1.417	-2,205	2.054	2.318	1.058
2017	AT 'Rivnehaz'	1.226	11.122	1.849	1.917	1.786
2018		1.343	26.338	1.686	1.783	1.465
2019		1.401	112,279	1.744	1.760	1.504
2020		2.300	-9,990	3.471	3.608	2.224
2021		2.112	-4,499	3.762	3.723	1.816
2017	AT 'Ternopilhaz'	1.904	5.608	5.470	6.423	3.131
2018		0.923	5.833	1.936	2.110	1.145
2019		0.861	8.058	1.743	1.902	2.686
2020		0.811	-4,936	2.476	3.045	0.919
2021		0.596	-0,652	1.333	1.914	0.644
2017	AT 'Hmelnytskhaz'	1.157	2.597	2.211	2.308	2.326
2018		1.261	9.139	1.783	1.951	1.653
2019		3.371	10.733	10.159	11.069	9.352
2020		1.927	-10,957	3.344	3.408	2.035
2021		1.706	-4,106	3.481	3.713	1.593
2017	AT 'Chernivtsihaz'	1.489	-9,240	2.670	2.922	1.510
2018		1.590	-12,635	2.105	2.183	1.454
2019		4.859	-11,118	14.875	16.562	3.735
2020		4.929	-5,343	16.644	21.584	2.948
2021		3.121	-1,845	9.035	10.942	1.527

– equity payback period (EPP). The coefficient helps to determine the time needed to compensate the equity with profits. The lower is the value the more efficient is the company:

$$EPP = \frac{\text{Equity}}{\text{Net income}} \quad (15)$$

– capital payback period (CPP). If to consider this coefficient, it characterizes the time needed to compensate all the capital of a gas distribution company (including invested capital) with the net income of the company.

$$CPP = \frac{\text{Balance}}{\text{Net income}} \quad (16)$$

Relative indicators of business activity.

It is worth mentioning that business activity is the complex characteristics of a company that determines its place on the market, describes the system of business relations, and characterizes the gas distribution company's image and innovative-investment activity, etc. Therefore, in our opinion, the following indicators should be considered to estimate competitiveness:

– total asset turnover ratio (ATR). The coefficient shows the intensity of a company's total capital turnover. The fact of growing current assets on condition of the company's profitability is a positive trend.

$$ATR = \frac{\text{Net sales}}{\text{Total assets}} \quad (17)$$

– equity turnover ratio (ETR). The coefficient indicates the intensity of a company's equity turnover. Growing dynamics is considered positive.

$$ETR = \frac{\text{Net sales}}{\text{Equity}} \quad (18)$$

– current asset turnover ratio (CATR). It shows the number of turnovers of current assets in a certain period and the amount of net sales per one hryvnya of current assets.

$$CATR = \frac{\text{Net sales}}{\text{Current assets}} \quad (19)$$

– receivables turnover ratio (RTR). It shows how much the revenue exceeds the accounts receivable. The growing value of this indicator confirms the fact of sales with the possibility of deferred payment by the cost of agreements and deadlines as well as improving payment discipline. Therefore, the fact of dynamic growth of the indicator's value is positive.

$$RTR = \frac{\text{Net sales}}{\text{Accounts receivable}} \quad (20)$$

– accounts payable turnover ratio (ARTR). It shows in quantitative terms how often the debt occurs over a certain period for a gas distribution company, which is subsequently covered by the latter. The growing value of this indicator (coefficient) can prove the fact of improving fulfillment of payment obligations in the process of interaction with budget organizations, creditors, and suppliers, or declining purchases with deferred payment.

$$ARTR = \frac{\text{Product costs}}{\text{Accounts payable}} \quad (21)$$

Relative indicators of financial resilience. This group of indicators demonstrates the dependence of a company's financial risks on borrowed capital. In particular, it means that financial resilience indicators show the company's ability to

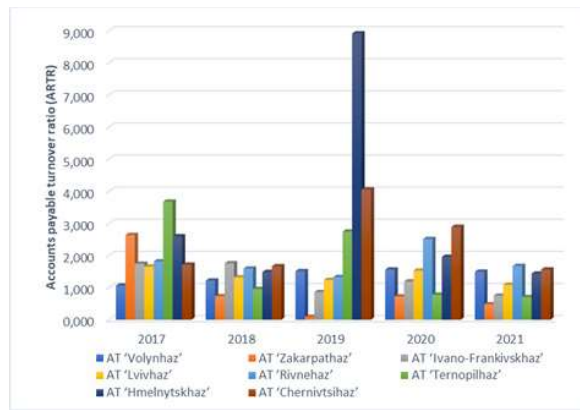


Fig. 4. Accounts payable turnover ratio (ARTR) in years 2017–2021

Rys. 4. Wskaźnik rotacji zobowiązań (ARTR) w latach 2017–2021

react to the external and internal environment without decreasing the financial and production effects of the activity.

– autonomy ratio (coefficient of financial independence) (AR). It reflects the share of a company's assets generated by its equity. The critical value of the coefficient is 0.5.

$$AR = \frac{Equity}{Balance}, \quad (22)$$

– financial dependence ratio (FDR). The indicator is inversely proportional to the autonomy ratio. If the indicator grows, the share of borrowed financial resources gains importance, which confirms the loss of financial independence by a gas distribution company. The value <2 is considered optimal for this indicator. If the coefficient falls to 1, it can be assumed that the company's operation is secured only due to owners' resources.

$$FDR = \frac{Balance}{Equity}, \quad (23)$$

– leverage ratio (financial risk coefficient) (LR). The coefficient shows the ratio between borrowed funds and equity. It constitutes the generalized assessment of the financial resilience of a gas distribution company because it demonstrates the amount of borrowed funds against a unit of equity.

$$LR = \frac{Debt}{Equity}, \quad (24)$$

– solvency ratio (coverage coefficient) (SR). When characterizing a company's solvency, it is necessary to use the solvency coefficient (coverage coefficient). It shows a gas distribution company's ability to cover debts by equity:

$$SR = \frac{Equity}{Debt}, \quad (25)$$

– self-financing ratio (SFR). It indicates whether a gas distribution company has enough operating capital to secure funding of its needs in the process of current activity.

$$SFR = \frac{Operating\ capital}{Balance}, \quad (26)$$

– debt-to-equity ratio (D/E). It shows the share of balance assets created by reliable and stable funding sources.

$$D/E = \frac{Debt}{Equity}, \quad (27)$$

Relevant indicators of regional market (region/total rate for Ukraine). In our opinion, the positions and features of a region against the national market in Ukraine should be considered to evaluate the key positions of a regional operator of gas distribution networks on the natural gas market. It eliminates the scale effect on the market and helps to adequately assess the indicators of each regional natural gas distribution market. The relevant indicators of regional market are listed below.

The specific quantity of households applying for subsidies to buy liquefied gas or solid or liquid household fuel. The specific quantity of households with assigned subsidies to buy liquefied gas or solid or liquid household fuel [34, 35].

The specific quantity of households having received subsidies to buy liquefied gas or solid or liquid household fuel. The specific weight of the sum of assigned subsidies to buy liquefied gas or solid or liquid household fuel by the type of area, total (in urban and rural areas separately). The ratio of the average size of assigned subsidies to buy liquefied gas or solid or liquid household fuel in a region and Ukraine (in urban and rural areas separately). The specific weight of the sum of received subsidies to buy liquefied gas or solid or liquid household fuel in a region (in urban and rural areas separately). The length of the gas distribution system in an oblast against the national rate (across the type of ownership). Capital investment by the types of industrial activity, gas, electricity, steam, and air conditioning supply against the total amount in an oblast, %. The growth rate of the cost and income from natural gas. The growth rate of the cost and income from liquefied gas.

Results and discussion

Based on the methodological approaches, the integral indicator of the "performance" of regional gas distribution companies under research (natural gas distribution operators) was calculated.

At the first research stage, the system of analytical indicators necessary to perform further calculations was selected and analyzed. For this purpose, a broad range of statistical and financial information regarding the activity of gas distribution companies in the Western Region of Ukraine in 2017–2021 was systematized [36–41]. For data processing, approaches were applied, which were used by authors for analyzing the economic and technical parameters in the operation of mining enterprises [42].

Tab. 5. Relative indicators of financial resilience of the gas distribution companies in the Western Region of Ukraine in 2017–2021

Tab. 5. Względne wskaźniki odporności finansowej spółek dystrybucji gazu w zachodnim regionie Ukrainy w latach 2017–2021

Year	Regional gas distribution network operator	Autonomy ratio	Financial dependence ratio	Leverage ratio	Solvency ratio	Self-financing ratio	Debt-to-equity ratio
2017	AT 'Volynhaz'	0,002	588,633	587,633	0,002	-0,243	0,250
2018		0,010	104,206	105,206	0,010	-0,120	0,144
2019		-0,150	-6,675	-7,675	-0,130	-0,293	-0,007
2020		-0,495	-2,020	-3,020	-0,331	-0,791	-0,377
2021		-0,677	-1,478	-2,478	-0,404	-0,962	-0,489
2017	AT 'Zakarpataz'	0,165	6,054	5,054	0,198	-0,043	0,290
2018		0,103	9,726	8,726	0,115	0,049	0,137
2019		-0,068	-14,789	-15,789	-0,063	-0,123	-0,037
2020		-0,285	-3,512	-4,512	-0,222	-0,489	-0,130
2021		-0,933	-1,071	-2,071	-0,483	-1,133	-0,790
2017	AT 'Ivano-Frankivskhaz'	0,101	9,861	8,861	0,113	-0,138	0,153
2018		0,061	16,509	15,509	0,064	-0,088	0,095
2019		0,198	5,049	4,049	0,247	-0,204	0,307
2020		-0,141	-7,110	-8,110	-0,123	-0,748	0,029
2021		-0,752	-1,330	-2,330	-0,429	-1,305	-0,596
2017	AT 'Lvivhaz'	0,234	4,265	3,265	0,306	-0,042	0,295
2018		0,103	9,726	8,726	0,115	-0,068	0,137
2019		-0,068	-14,789	-15,789	-0,063	-0,227	-0,037
2020		-0,527	-1,897	-2,897	-0,345	-0,757	-0,486
2021		-0,643	-1,556	-2,556	-0,391	-0,870	-0,560
2017	AT 'Rivnehaz'	0,110	9,072	8,072	0,124	-0,097	0,240
2018		0,051	19,612	18,612	0,054	-0,086	0,118
2019		0,012	80,161	79,161	0,013	-0,119	0,078
2020		-0,230	-4,343	-5,343	-0,187	-0,462	-0,124
2021		-0,469	-2,130	-3,130	-0,319	-0,761	-0,322
2017	AT 'Ternopilhaz'	0,340	2,945	1,945	0,514	-0,312	0,340
2018		0,158	6,318	5,318	0,188	-0,365	0,158
2019		0,107	9,357	8,357	0,120	-0,399	0,107
2020		-0,164	-6,087	-7,087	-0,141	-0,724	-0,164
2021		-0,914	-1,094	-2,094	-0,478	-1,467	-0,914
2017	AT 'Hmelnytskhaz'	0,446	2,245	1,245	0,803	0,001	0,478
2018		0,138	7,250	6,250	0,160	-0,024	0,269
2019		0,314	3,184	2,184	0,458	-0,039	0,629
2020		-0,176	-5,687	-6,687	-0,150	-0,413	0,011
2021		-0,415	-2,407	-3,407	-0,294	-0,714	-0,204
2017	AT 'Chernivtsihaz'	-0,161	-6,208	-7,208	-0,139	-0,528	-0,085
2018		-0,126	-7,949	-8,949	-0,112	-0,324	-0,079
2019		-0,437	-2,288	-3,288	-0,304	-0,985	-0,320
2020		-0,922	-1,084	-2,084	-0,480	-1,511	-0,807
2021		-1,692	-0,591	-1,591	-0,628	-2,242	-1,588

For example, if we analyze relative indicators of property status and efficiency of property use, the component remains to be rather negative (Table 1).

Fixed assets operability ratio (Rfao). According to Table 1, the indicator is within the optimal range (over 0.5), showing the overall satisfactory condition of fixed assets of gas distribution companies. For example, AT 'Hmelnytskhaz' had the highest coefficient in 2019 (0.621), although it decreases annually.

Fixed assets depreciation ratio (Rfad). The coefficient is in inverse proportion to the fixed assets operability ratio. The calculations show that the situation is the best for AT 'Hmelnytskhaz' (0.379).

Mobility rate (Rmob). The coefficient is rather high for AT 'Lvivhaz' against other oblast gas companies. Meanwhile, it remains low for AT 'Ivano-Frankivskhaz' (0.279).

Capital and current assets ratio (Rcca) is about the same for all oblast gas companies, yet, it is characterized by instability.

Capital productivity (CapProd). As it was already mentioned in the methodology, the best situation in terms of capital productivity among the gas distribution companies is for Lvivhaz, where the value of the indicator is 6.046, meaning that each hryvnya invested in fixed assets brings over 6 UAH of output or provided services. Meanwhile, the performance in terms of using the property of AT 'Zakarpataz' and AT 'Ternopilhaz' is quite low: the capital productivity coefficient is 1.122 and 1.111, respectively, showing the low quality of fixed assets management (fig. 1).

Capital intensity (CapInt). Regarding the capital intensity, AT 'Lvivhaz' (0.165), AT 'Chernivtsihaz' (0.175), and AT 'Rivnehaz' (0.185) can be considered the leaders by this indicator. Meanwhile, AT 'Zakarpataz' and AT 'Ivano-Frankivskhaz' faced the problem of high production assets expenditures per unit of output/provided services: 0.891 and 0.806.

Capital-labor ratio (Rcl). Assessing the level of labor equipment with production assets, it is worth emphasizing the following facts. AT 'Volynhaz' (301.379 UAH/employee) and AT 'Hmelnytskhaz' (281.372 UAH/employee) have leading positions by this component. AT 'Ternopilhaz' is ranked the last – 144.537 UAH/employee.

The relative indicators of a company's liquidity constitute the next group of integral index indicators (Table 2). Current ratio (Rcurrent). The optimal limits of this indicator are only 0.7–1 (green color in the Table marks the optimal values and red color – negative values). As we can see, all gas distribution companies had problems with current liquidity last 2–3 years, so the possibility for a gas distribution company to cover its liabilities by promptly available liquid assets is very low.

Quick ratio (Rquick). The standard value of the indicator should be 1–3. In this case, the coefficient value is quite low and decreases annually, showing the lack of enough hryvnas of current assets per each hryvnya of current liabilities. Cash ratio (Rcash). The coefficient within 0.1–0.2 is considered the standard value of the indicator. Unfortunately, none of the gas distribution companies adheres to the specified value, so we can assume that none of the companies under research is capable to cover debts on time in case of an urgent need. Changing of the cash ratio (Rcash) in years 2017–2021 is presented in fig. 2.

The third group of indicators includes the relative indicators of a company's profitability (Table 3). The situation for the gas distribution companies is negative because their activity



Fig. 5. Debt-to-equity ratio in years 2017–2021

Rys. 5. Wskaźnik zadłużenia do kapitału własnego w latach 2017-2021

remains lossmaking. Therefore, the return on equity and equity payback period remains to be with a negative sign. The changing of the capital payback period in years 2017 -2017 is presented in fig. 3.

Relative indicators of business activity. General indicators of this group are outlined in Table 4.

The changing of the accounts payable turnover ratio (ARTR) in years 2017 – 2021 is presented in fig. 4.

For example, the received data shows that AT 'Chernivtsihaz' (3.121) remained in 2021 the most competitive by the total asset turnover ratio. Although the value of the coefficient declined by over 1.7 points compared to 2020. Meanwhile, Ternopilhaz or Zakarpataz are ranked the last: the coefficient value is 0.596 and 0.351, respectively.

The equity turnover ratio for the companies under research is of negative nature due to operating losses of the gas distribution companies. The trend has been observed lately.

The current assets turnover ratio shows the maximum number of current assets turnovers in a certain period and the maximum revenues per 1 hryvnya of current assets for such gas distribution companies as AT 'Hmelnytskhas', AT 'Rivnehaz', and AT 'Chernivtsihaz'. The coefficient values are 3.481, 3.762, and 9.035, respectively. Meanwhile, the value of the coefficient for Zakarpataz in 2021 was very low – 0.535, and a received hryvnya of revenues didn't cover the hryvnya of current resources [43, 44].

The receivables turnover ratio was the highest in the period under research for Chernivtsihaz – 10.942 in 2021. The economic interpretation of this indicator is the following: revenues exceed the receivables 10.9 times. It indicates the facts of sales with the possibility of deferred payment by the cost of agreements and deadlines as well as improving payment discipline for the company. If we consider other gas distribution companies, for example, the value of the indicator for Zakarpataz is much lower – 0.558, and revenues do not cover the receivables almost twice.

Analyzing the accounts payable turnover ratio, we can agree that the indicator is not stable for the gas distribution companies. For example, we can trace the negative trend for 2020–2021. It shows the deteriorating fulfillment of payment obligations in the process of interaction with budget organizations, creditors, and suppliers or declining purchases with deferred payment [45, 46].

Relative indicators of financial resilience. This group of coefficients estimates the dependence of a company's financial risks on borrowed capital.

Therefore, the calculations indicate quite an ambiguous situation for the gas distribution companies because the companies under research are lossmaking. Meanwhile, the situation regarding the indicators under research remained almost unchanged for each gas distribution company. Changing the debt-to-equity ratio in years 2017–2021 is presented in fig. 5.

The changing the debt-to-equity ratio in years 2017–2021 is presented in fig. 6.

Changing the average number of regular employees to number of CSCs ratio in years 2017–2021 in fig. 7.

Having considered the calculated indicators of the positions of regional gas distribution system operators functioning on the Western regional natural gas market, we can see that AT 'Ternopilhaz' is in the last position. It is especially obvious by the number of households applying for subsidies to buy liquefied gas and solid and liquid household fuel, those with assigned subsidies, and those having received subsidies. Indicators of CSCs performance constitute the last group of indicators (Tables 6,7).

The analysis of GDCWRU performance results shows that the activity of AT 'Ternopilhaz' remains quite inefficient against the other gas distribution companies of the Western Region.

Comparing AT 'Ternopilhaz' (no CSC network) with AT 'Chernivtsihaz' and AT 'Hmelnytskhas', where the network is maximally branched, consists of 11 CSCs, and is consistently expanding, we can observe one of the main problems of such result – the lack of proper service position regarding the consumer sector that lies in the absence of CSCs in the structure of AT 'Ternopilhaz'. Thus, the population burden on the company is quite high (in the process of calculations we assumed that AT 'Ternopilhaz' had 1 CSC, which was the oblast gas company itself).

Therefore, the complex calculation of a broad range of indicators related to the activity of gas distribution companies operating in the Western Region of Ukraine and regional markets of distribution and consumption of natural gas as well as standardization of initially formed groups of indicators obtained in the process of the research bring about the following results (Table 8).

Tab. 6. Indicators of performance of the Customer Service Centers in the structure of regional gas distribution companies in 2017–2021. №1

Tab. 6. Wskaźniki efektywności Centrów Obsługi Klienta w strukturze regionalnych spółek dystrybucji gazu w latach 2017–2021. №1

Year	Regional gas distribution network operator	Resident population in the region to number of CSCs ratio, thousand persons/units	Households applying for subsidies to buy liquefied gas, solid or liquid household fuel to number of CSCs in the region ratio	Specific quantity of households with assigned subsidies to buy liquefied gas, solid or liquid household fuel to number of CSCs in the region ratio
2017	AT 'Volynhaz'	148,957	4100,000	3701,714
2018		148,714	6280,286	5975,286
2019		148,357	5157,143	4370,857
2020		147,900	5092,857	4112,857
2021		147,343	3585,857	2658,000
2017	AT 'Zakarpathaz'	314,075	5286,750	4373,750
2018		313,975	8477,250	6918,000
2019		313,825	8109,000	6878,250
2020		313,500	6105,500	5309,750
2021		312,750	4331,500	3867,500
2017	AT 'Ivano-Frankivskhaz'	229,967	3243,500	2482,667
2018		229,933	4210,667	3594,833
2019		229,533	4645,333	3885,500
2020		229,133	3679,500	3207,000
2021		228,417	2724,000	225,833
2017	AT 'Lvivhaz'	503,520	2724,400	2526,200
2018		503,131	4221,400	3675,400
2019		502,248	4571,200	3966,200
2020		500,730	3795,000	3343,400
2021		498,743	2348,600	2174,400
2017	AT 'Rivnehaz'	193,350	6031,333	3217,667
2018		193,633	7432,667	6097,833
2019		193,617	5784,500	5322,333
2020		193,267	5549,000	4898,500
2021		192,700	3990,667	3459,500
2017	AT 'Ternopilhaz'	1062,500	14815,000	12906,000
2018		1055,900	19488,000	18947,000
2019		1049,100	18457,000	16667,000
2020		1042,600	21938,000	14510,000
2021		1035,400	11648,000	8697,000
2017	AT 'Hmelnytskhaz'	117,673	2674,909	1988,364
2018		116,555	3657,273	3165,636
2019		115,564	3311,545	3030,364
2020		114,682	2937,091	2483,455
2021		113,773	1944,909	1649,182
2017	AT 'Chernivtsihaz'	302,267	8577,000	7147,667
2018		301,700	8337,667	9224,000
2019		301,200	10711,000	9872,333
2020		300,433	10392,000	7561,000
2021		299,533	6813,000	4906,333

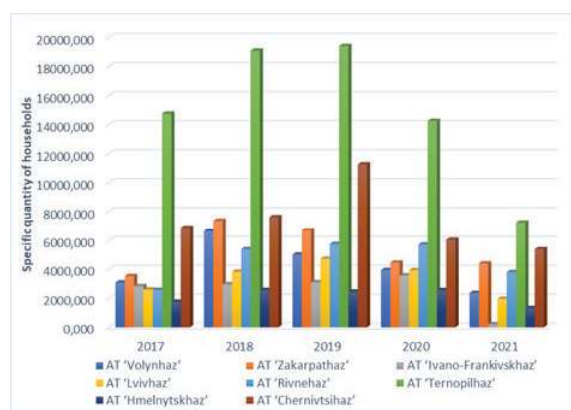


Fig. 7. Debt-to-equity ratio in years 2017–2021

Rys. 7. Wskaźnik zadłużenia do kapitału własnego w latach 2017–2021

Conclusion

Gas distribution refers to the process of delivering natural gas or other gases from the source (such as gas fields or liquefied natural gas terminals) to end-users, including residential, commercial, and industrial customers. The purpose of gas distribution is to provide a reliable and efficient supply of gas for various purposes, including heating, cooking, hot water production, industrial processes, and power generation.

Networks for gas distribution ensure a consistent supply of gas to meet the energy needs of residential, commercial, and industrial consumers. Natural gas is a versatile and widely used energy source due to its high calorific value and relatively low environmental impact compared to other fossil fuels. Gas distribution systems are designed and operated with safety as a top priority. The purpose is to ensure the

safe and reliable delivery of gas to end-users. This involves monitoring and maintaining the integrity of pipelines, implementing safety measures, conducting regular inspections, and responding quickly to gas leaks or emergencies. The purpose is to extend gas access to previously underserved regions, support economic growth, and provide an alternative to other energy sources. Expanding gas distribution networks can help promote the use of cleaner energy sources and support the transition to a more sustainable energy mix.

Gas distribution networks support economic development by enabling the use of gas for various industrial applications, power generation, and heating needs. Access to natural gas can attract businesses and industries that rely on affordable and reliable energy sources, thus driving economic growth and job creation. Overall, the purpose of gas distribution is to deliver a clean, reliable, and affordable energy

Tab. 7. Indicators of performance of the Customer Service Centers in the structure of regional gas distribution companies in 2017–2021. №2

Tab. 7. Wskaźniki efektywności Centrów Obsługi Klienta w strukturze regionalnych spółek dystrybucji gazu w latach 2017–2021. №2

Year	Regional gas distribution network operator	Average number of regular employees to number of CSCs ratio, thousand persons/units	Material inputs to number of CSCs ratio, thousand UAH/units	Return on assets across CSCs	Return on equity across CSCs
2017	AT 'Volynhaz'	203,000	76947,571	-0,022	-12,955
2018		172,286	225634,857	0,000	-0,050
2019		176,429	245094,143	-0,019	0,128
2020		176,143	254630,429	-0,041	0,082
2021		176,143	211282,857	-0,019	0,028
2017	AT 'Zakarpataz'	342,250	73589,750	-0,050	-0,301
2018		305,250	44982,750	-0,009	-0,037
2019		305,250	57048,750	-0,001	0,005
2020		276,000	128027,000	-0,114	0,401
2021		251,250	117751,250	-0,167	0,178
2017	AT 'Ivano-Frankivskhaz'	586,833	49644,333	-0,021	-0,205
2018		586,833	37894,000	0,000	0,005
2019		586,833	46131,167	-0,005	-0,026
2020		388,667	63265,667	-0,068	0,484
2021		378,333	75694,333	-0,105	0,140
2017	AT 'Lvivhaz'	825,200	75665,000	-0,020	-0,085
2018		687,200	107768,400	-0,005	-0,051
2019		682,000	976147,200	0,033	-0,492
2020		648,800	980117,000	-0,087	0,165
2021		670,800	1049888,400	-0,044	0,068
2017	AT 'Rivnehaz'	266,333	149677,000	-0,019	-0,170
2018		242,333	281739,333	-0,001	-0,027
2019		236,833	316935,500	-0,006	-0,499
2020		219,000	322492,000	-0,042	0,184
2021		212,500	254508,000	-0,035	0,075
2017	AT 'Ternopilhaz'	1588,000	127106,000	-0,113	-0,331
2018		1354,000	247760,000	-0,126	-0,794
2019		1288,000	167115,000	-0,053	-0,495
2020		1280,000	203034,000	-0,402	2,446
2021		1288,000	188831,000	-0,734	0,803
2017	AT 'Hmelnytskha'	208,818	109483,818	-0,003	-0,007
2018		167,000	206477,364	0,000	-0,004
2019		170,000	227653,091	-0,019	-0,061
2020		167,182	228813,545	-0,022	0,127
2021		177,273	186376,000	-0,020	0,049
2017	AT 'Chernivtsihaz'	411,667	273575,000	-0,074	0,457
2018		376,000	497107,000	-0,010	0,077
2019		373,667	572628,667	0,164	-0,374
2020		373,667	613414,000	0,320	-0,347
2021		336,667	536946,667	-0,318	0,188

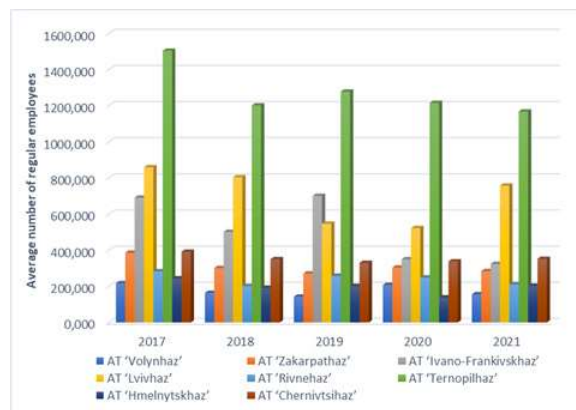


Fig. 7. Average number of regular employees to number of CSCs ratio in years 2017–2021

Rys. 7. Średni stosunek liczby pracowników etatowych do liczby POK w latach 2017–2021

source to consumers while ensuring safety, reliability, and environmental sustainability. Additionally, gas distribution companies require proper management based on various economic, efficiency and clearly business indicators, as shown in this publication.

Having analyzed the data (the results of the research) in Table 7, the following conclusions can be made:

The positions of the gas distribution companies in the Western Region of Ukraine change each year, in our opinion, due to different values of their general performance indicators, low innovative activity, national natural gas distribution market condition, regional features of the gas distribution companies' functioning, number of regional actors on the regional natural gas distribution market, regional tariffs at a certain moment in time, level of pressure of financial activity control authorities.

AT 'Zakarpataz' can be considered the most competitive in the last two years as it held the first position in 2020 and 2021.

The activity of Ternopilhaz remains challenging. It has severely deteriorated its positions starting since 2017. In our opinion, the causes can be the following: the lack of innovative solutions in the company's activity, showing itself in outdated approaches to professional activity on regional natural gas distribution market, lack of initiatives offered by the company's management to organize and further expand the Customer Service Center network in the structure of the company that would substantially facilitate the process of natural gas distribution service consumption for customers and intensify the growth of innovative activities and approaches.

Tab. 8. Integral value and rating indicator of the gas distribution companies' performance in the Western Region of Ukraine

Tab. 8. Integralna wartość i wskaźnik oceny wyników spółek dystrybucji gazu w zachodnim regionie Ukrainy

Years	2017		2018		2019		2020		2021	
	Integral value	Rating indicator	Integral value	Rating indicator	Integral value	Rating indicator	Integral value	Rating indicator	Integral value	Rating indicator
AT 'Volynhaz'	0,007	7	0,018	2-3	0,019	1-3	0,02	2	0,017	4
AT 'Rivnehaz'	0,009	5-6	0,017	4	0,019	1-3	0,019	3-5	0,015	8
AT 'Ivano-Frankivskhaz'	0,014	2	0,012	7	0,014	8	0,017	7-8	0,02	2
AT 'Ternopilhaz'	0,012	3	0,021	1	0,015	7	0,018	6	0,016	5-7
AT 'Lvivhaz'	0,001	8	0,002	8	0,017	5	0,017	7-8	0,018	3
AT 'Zakarpathaz'	0,017	1	0,014	6	0,016	6	0,025	1	0,023	1
AT 'Hmelnytskhaz'	0,01	4	0,018	2-3	0,019	1-3	0,019	3-5	0,016	5-7
AT 'Chernivtsihaz'	0,009	5-6	0,015	5	0,018	4	0,019	3-5	0,016	5-7

Acknowledgements

Paper was presented during the 8th POL – VIET International Conference Scientific-Research Cooperation between Vietnam and Poland, 2023, AGH University, Krakow, Poland.

This publication and research was funded from subvention for the maintenance and development of research potential granted to AGH University, Management Faculty, Kraków, Poland.

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Określenie poziomu efektywności przedsiębiorstw zajmujących się dystrybucją gazu w zachodnim obwodzie Ukrainy

W artykule dokonano analizy aktualnej sytuacji i procesów przemian strukturalnych w ukraińskim sektorze gazu ziemnego, szczególnie w jego zachodnim regionie. Ciągłe występowanie naruszeń równowagi rynkowej pomiędzy popytem a produkcją spowodowało konieczność przeprowadzenia reform w sektorze gazowym Ukrainy i jej regionów. Z punktu widzenia bezwarunkowego znaczenia przedsiębiorstw dystrybucji gazu w kształtowaniu struktury i funkcjonowaniu sektora gazowego państwa, znaczenie prawidłowego funkcjonowania sieci dystrybucyjnych gazu ziemnego wśród odbiorców w dobie wojny oraz kryzysów polityczno-gospodarczych pozwoli na zmniejszenie poziom potencjalnych zagrożeń, a także zapewnić integralność zliberalizowanego systemu dystrybucji gazu ziemnego jako całości. Metody zastosowane w procesie analizy poziomu efektywności regionalnych systemów dystrybucji gazu obejmują metodologię ocen eksperckich, co pozwoliło na uogólnioną ocenę oczekiwanych wyników, przyczyniło się do ujednoczenia istniejących podejść, odzwierciedlających poziom ekonomii i rynku efektywność, działalność innowacyjną i stabilność finansowa przedsiębiorstw zajmujących się dystrybucją gazu. W trakcie badania udało się określić poziom zapotrzebowania na kompleksowe działania, obejmujące szereg działań – analizę otoczenia instytucjonalnego zachodnio ukraińskiego rynku dystrybucji gazu ziemnego, w skład którego wchodzi następujące spółki akcyjne: „Wołyńhaz”, „Również”, „Iwano-Frankiwska”, „Ternopolhaz”, „Lwówhaz”, „Zakarpacie”, „Hemlnytschaz”, „Czerniowce”. W wyniku badania stwierdzono, że poziom dostaw z zachodnio ukraińskich spółek zajmujących się dystrybucją gazu regularnie się zmienia; Spółkę Akcyjną „Zakarpacie” można uznać za najbardziej perspektywiczną i konkurencyjną; jednocześnie Spółka Akcyjna „Ternopilhaz” charakteryzuje się najniższym poziomem swojej aktywności zawodowej.

Słowa kluczowe: dystrybucja gazu, zarządzanie przedsiębiorstwami zajmującymi się dystrybucją gazu, ekonomiczno-biznesowe wskaźniki efektywności, efektywność dystrybucji, zachodnia Ukraina