Economic Assessment of the Concentration of Water Transport in the Republic of Tatarstan

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Abstract: Water transport services in the Republic of Tatarstan are provided by more than 70 enterprises. The volume of trade turnover increased from 6 to 18 billion rubles from 2018 to 2022. This growth was due to a slight increase in the companies' assets from 7.5 to 8.8 billion rubles. This is due to the increase in economic activity after the COVID-19 pandemic, the abandonment of Russian markets by foreign companies and the emergence of free market niches that Russian manufacturers are actively developing, as well as the relatively low cost of transport services. The object of research is water transport of the Republic of Tatarstan. This region is located in the Volga-Kama basin. It has a favorable economic and geographical position and is the leader of the Volga Federal District in terms of economic development indicators. There are 5 largest companies on the market, which have controlled more than 70% of the market turnover for five years. Moreover, these companies own about 35% of total assets. A high level of capitalization of firms does not ensure a high level of sales concentration. The market leader is Tatbunker LLC. The closest competitors are SK Bunker LLC and Bunker-Trade LLC, each occupying approximately 17% of the market. All three companies specialize in the supply and bunkering of petroleum products and fuel. KRK LLC operates in Naberezhnye Chelny. It is focused on a narrow market segment and covers local consumers. JSC SK Tatflot is one of the largest enterprises operating in the Volga and Kama waters, but is now undergoing bankruptcy proceedings. Economic concentration in the market has increased over the past 5 years. Small companies operate in local market segments. They provide services for transporting passengers and goods (crushed stone, rock gravel, natural sand, sand and gravel mixtures, etc.), and yachting. Barriers to entry into the market are relatively low. We found a weak relationship between market share and market power of water transport companies. In future, one may expect that the trend will preserve to increase concentration and market power of the companies.

1 INTRODUCTION

The removal of infrastructure constraints to economic growth for regions and industries is a priority for the Russian economy. According to the data provided by a counterparty check service, 72 companies are engaged in water transport services in the Republic of Tatarstan as of January 1, 2023. At the same time, the total turnover in this market has grown from 6 to 18 billion rubles over the last 5 years. This growth occurred against the background of the cost of sales increase from 6.2 to 15.4 billion rubles. The net profit of all market participants fluctuated by year; in 2018 and 2020 the industry was unprofitable, but by the end of 2022 the net profit amounted to 661 million rubles. At the same time, the assets of companies increased insignificantly over 5 years – from 7.5 to 8.8 billion rubles (Fig. 1).

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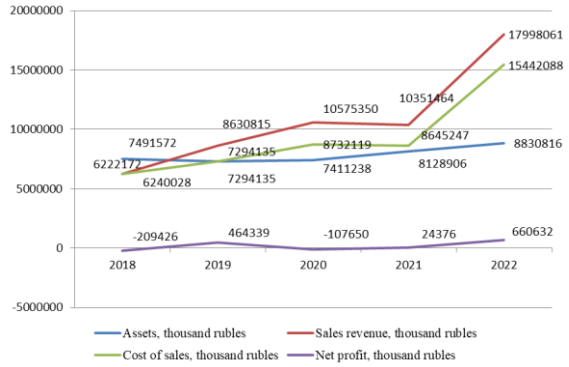

Figure 1: Dynamics of economic indicators of the water transport in the Republic of Tatarstan.

This trend is, firstly, due to the economic activity growth in the post-pandemic period. Secondly, it is associated with the departure of foreign companies in many sectors of the country's economy, and the emergence of unoccupied market niches that are being actively developed by the inland producers. This, in turn, leads to an increase in demand for water transportation services from industry, agriculture, construction, trade, and tourism. For example, 6 new companies entered the market in 2023 only. Thirdly, this type of transportation is the cheapest to use, as it does not require high initial, primarily infrastructural, investments.

The study objective is to assess the market concentration level, identify the market leaders, determine the level of their market power, and provide a short-term forecast of these market parameters.

2 METHODS

A review of scientific studies on the development of transportation industry concentration has shown that its research object is usually the aviation industry (Grosche, 2022; Paul et al., 2023). Different approaches are pursued in regard to market power assessment, including the switching potential of passengers and airlines, or the implications of airports as two-sided markets, enabling a comprehensive insight whether an airport has a dominant position on a particular market segment. Market concentration on a city pair is measured using the Herfindahl-Hirschman Index (HHI) based on quality-weighted nonstop and connecting flights. The work (Tserkovna and Rahimi, 2023) considers the peculiarities of river transport development, its role and development trends in the modern transport system of Ukraine. The article (Ferreira et al., 2024) proposes a sustainability index to evaluate water transport in Amazonas-Brazil, aiming to support decisions and promote effective actions.

We have chosen the water transport of the Republic of Tatarstan as the research object due to the fact that this region is located in the Volga-Kama basin, has a favorable economic and geographical position, is the leader of the Volga Federal District in terms of economic development. Therefore, it is of interest in terms of economic processes occurring at different stages of the market life cycle (Mironova et al., 2022). We assume that water transportation in other regions of the Volga Federal District, which are catching up regions, will develop according to a similar scenario. In addition, the region's economy is one of the most balanced in terms of the inter-industry structure complexity (Abashkin et al., 2021). The region has 41 industries of national and local importance, while the production of primary metal products belongs to the industries of national importance. This helps to avoid the impact of disproportions of the regional structure of the economy – excessive development of some industries and lagging behind of others. Therefore, it is important to assess the market concentration level, identify market leaders, determine the level of their market power, and provide a short-term forecast of these market parameters.

Economic concentration implies transactions and other actions, the implementation of which affects the state of competition (Federal Law "On Protection of Competition"; Zazdravnykh, 2023). Economic concentration is understood as the number of sellers in the market and the degree of their influence on the market price (Rozanova, 2023).

Many scientists have studied theoretical and methodological aspects of assessing the concentration level of industrial markets (Kostetska and Liakhovych, 2023). Various indicators are used to determine the economic concentration of the market. The market concentration ratio is calculated as the sum of the shares of the largest economic entities operating in the market:

$$CR = \sum_{j=1}^{m} S_j \quad (1)$$

where S_j is the market share of the j-th company;
m is the number of large companies in the market.
The Herfindahl-Hirschman index is calculated as:

$$HHI = \sum_{i=1}^{n} S_i^2 \quad (2)$$

where S_i is the market share of the i-th company;

n is the number of companies in the market.

The maximum share index is calculated as:

$$I_{\max} = \frac{S_{\max} - \overline{S}}{S_{\max} + \overline{S}} \quad (3)$$

where S_{max} is the market share of the largest company;

$\overline{S}$ is the average market share of companies.

The Lindh coefficient for the two largest producers is calculated as:

$$L_n = \frac{S_1}{S_2} \cdot 100 \quad (4)$$

where S_1 is the market share of the largest company;

S_2 is the market share of the second largest company.

The relative concentration coefficient is calculated as:

$$K = (20 + 3\alpha)/\beta \quad (5)$$

where K is the relative concentration coefficient;

β is the share of the number of large companies in the total number of companies in the market, %;

α is the share of products of these companies in the total production volume, %.

The entropy coefficient is calculated as:

$$E = 1/n \sum_{i=1}^{n} \left[S_i \cdot \ln\left(\frac{1}{S_i}\right) \right] \quad (6)$$

where E is the entropy coefficient.

where S_j is the market share of the j-th company;

m is the number of large companies in the market.

3 RESULTS AND DISCUSSION

As the first step, we found market shares of firms by sales revenue and asset size (Table 1).

Table 1: Dynamics of the market shares of the largest water transport companies in the Republic of Tatarstan.

Entities	2018		2019		2020		2021		2022	
	by sales revenue	by assets	by sales revenue	by assets	by sales revenue	by assets	by sales revenue	by assets	by sales revenue	by assets
Tatbunker LLC	0.104	0.028	0.166	0.034	0.194	0.050	0.159	0.028	0.229	0.045
SK Bunker LLC	0.143	0.026	0.133	0.031	0.114	0.037	0.115	0.030	0.178	0.039
Bunker-Trade LLC	0.289	0.051	0.235	0.054	0.236	0.054	0.201	0.050	0.177	0.035
KRK LLC	0.0001	0.002	0.096	0.036	0.114	0.054	0.118	0.068	0.092	0.069
JSC SK Tatflot	0.177	0.245	0.079	0.201	0.057	0.219	0.069	0.191	0.049	0.167
Others (67 companies)	0.2869	0.648	0.291	0.644	0.285	0.586	0.338	0.633	0.275	0.645
Total	1	1	1	1	1	1	1	1	1	1

There are five largest companies on the market, which control over 70% of the market turnover for five years. At the same time, these companies own about 35% of total assets (Fig. 2). As we can see, the high level of capitalization does not ensure a high level of sales concentration.

All the companies under consideration, except for KRK LLC, are located in the city of Kazan. To understand the reasons and prerequisites for leadership, we shall take a closer look at each player's position. Tatbunker LLC, established in 2015, has increased its market share from 10.36% in 2018 to 22.96% in 2022 and is the market leader. Tatbunker LLC specializes in the supply and bunkering of petroleum products and fuels.

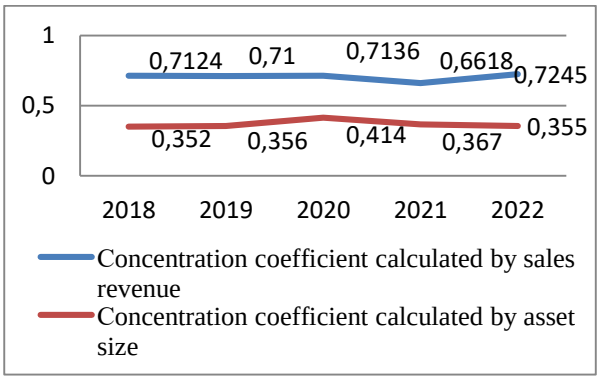

Figure 2: of the concentration coefficient of the water transport calculated by sales revenue and asset size.

SK Bunker LLC and Bunker-Trade LLC hold approximately 17% of the market each. Unlike its competitor, which has lost its lead over the past period, SK Bunker has been steadily increasing its market share from 14.32% to 17.75%. The company performs loading and unloading of dangerous goods

on inland water transport and transportation of dangerous goods by inland water and sea transport. Bunker-Trade LLC carries out supply and bunkering of oil products.

Stable turnover is observed for KRK LLC, a company established in 2018 and occupying about 10% of the market in the following years. KRK LLC operates in the city of Naberezhnye Chelny. We assume that the stability of its performance indicators is due to the fact that it is focused on a narrow market segment and covers the bulk of local consumers. The main type of the company's activity is inland water cargo transportation. In addition, it performs repair and maintenance of ships and boats, auxiliary activities related to water transport and transportation of cargo on inland waterways (crushed stone and gravel, natural sand, sand and gravel mixtures for road construction).

JSC SK Tatflot is one of the largest enterprises operating on the waterways of the Republic of Tatarstan, on the Volga and Kama rivers. It covers practically all areas related to water transport: passenger transportation, ship towing, cargo processing, well drilling, product manufacturing. It has branches and subdivisions: Kazan passenger port, Chistopol passenger port, Tetyushi wharf, and "Non-ferrous materials" Production Association. Tatflot, established back in 2004 and possessing 17% of all industry assets in 2022, became insolvent and insolvency (bankruptcy) proceedings were initiated against it on December 29, 2022. This was due to ineffective management, which led to an increase in the company's tax debt.

To determine the economic concentration of the market in the last 5 years, we used indicators comprising both the number of firms on the market and their market shares, and their heterogeneity (Table 2).

Table 2: Dynamics of the concentration indicators of the water transport in the Republic of Tatarstan in 2018-2022.

Concentration indicators	2018	2019	2020	2021	2022
Market concentration ratio ($\mathbf{CR}_5$)	0.7124	0.7100	0.7136	0.6618	0.7245
Herfindahl-Hirschman index	0.1571	0.1256	0.1289	0.1083	0.1317
Maximum share index	0.9082	0.8883	0.8888	0.8705	0.8859
Lindh coefficient (for the two largest producers)	201.54	141.35	121.67	126.32	129.35
Relative concentration coefficient	0.0974	0.0977	0.0973	0.1049	0.0952
Entropy coefficient	0.0664	0.0646	0.2655	0.0620	0.0347
Maximum value of the Lerner index of a firm in the market	0.7388	0.8114	0.9266	0.9497	0.8754
Minimum value of the Lerner index of a firm in the market	-2.0226	-3.0168	-0.1919	-0.2621	-0.8748

The market concentration ratio calculated for the five largest companies characterizes the market as highly concentrated, as it exceeds the 70% threshold and is still growing.

The Herfindahl-Hirschman index was high over the last five years; it is still growing and also characterizes the market as moderately concentrated.

The maximum share index is around 0.9, which corresponds to a monopoly market.

If the relative concentration ratio is less than 1, there is a high degree of concentration in the market; the market power of enterprises is large. We can see that this index remained low for 5 years.

The entropy coefficient measures the uneven distribution of shares between companies: the higher the entropy coefficient, the lower the ability of sellers to influence the market price. In this market, there is an increase in this index, which means that the market power of companies is growing.

The Lerner index is the resulting indicator of economic concentration, and its high value indicates the growth of market monopolization. From our findings, we can see that the maximum value of a company index increases from 0.74 to 0.88 in 5 years. The minimum value of the index also increases and indicates that although there are inefficient companies in the market, the unprofitability of their core business is decreasing.

Next, following the logic of (Banerjee et al., 2023) we will evaluate the market power of the largest companies (Table 3).

Table 3: Dynamics of the Lerner index of the largest water transport companies in the Republic of Tatarstan.

	2018	2019	2020	2021	2022
Tatbunker LLC	0.05	0.09	0.05	0.07	0.05
SK Bunker LLC	0.05	0.12	0.05	0.04	0.03
Bunker-Trade LLC	0.07	0.05	0.09	0.10	0.08
KRK LLC	-2.02	0.61	0.69	0.69	0.69

JSC SK Tatflot	-0.19	-0.13	-0.19	-0.26	0.02

Large market players have a low level of market power. KRK LLC, being unprofitable in 2019, had consistently high market power over the next 4 years. That is, leadership of companies in terms of market share does not guarantee obtaining high market power. This conclusion is confirmed by the results of regression analysis (Table 4).

Table 4: Regression analysis of the market power and production concentration of the water transport companies in the Republic of Tatarstan.

Indicator-factor	Coefficient	Standard error	t-statistics	P-value
const	0.2895	0.0715	4.0476	0.0002
S_{iTR}	-1.177	1.238	-0.951	0.347
S_{iA}	0.1635	1.804	0.091	0.928

The market share of a company, both in terms of revenue and assets, does not ensure its profitability. For example, the company GS FLOT LLC, established in 2021, had a market share of 0.72% in 2022 with a net profit of 112 million rubles and Lerner index of 0.91, while the net profit of the industry leader Tatbunker LLC was 14 million rubles. The reason is the heterogeneity of companies' activities and relatively low barriers to market entry.

4 CONCLUSION

In the future, the major player JSC SK Tatflot's departure from the market is sure to change the positions of other market players. Current and potential leaders will retain their competitive advantages due to long-term contracts with permanent partners. The desire to increase market share will stimulate the growth of production capacities, conclusion of new contracts, and diversification of activities. The stimulus for diversification is the development of the inner tourism in Russia and the people's growing demand for yachting and river cruises. According to the 2022 data, 26 companies had zero sales revenue. The number of personnel in them totaled 10 people, while the value of assets was about 124 million rubles. Relatively low exit barriers will affect the dynamics of the number of players. These inefficient companies are likely to leave the market. The growing number of companies and heterogeneity of activities reduce the probability of price-fixing collusion. In our opinion, the market tendency to increase concentration and market power of companies will continue in the long term.

REFERENCES

Abashkin, V. L., Gokhberg, L. M., Eferin, Ya. Yu., 2021. Atlas of economic specialization of the Russian regions. Moscow: NIU VShE.

Banerjee, A., Chatterjee, S., Dutta, A., 2023. Market power, industry concentration and earnings management: does corporate governance matter. The Journal of Risk Finance 25.

Counterparty check service. Main information about any Russian legal person or entrepreneur. URL: https://www.list-org.com/search?type=all&work=on&okato=92&okved=50&sort= (access date: 10.01.2024).

Federal Law "On Protection of Competition" of 26.07.2006 No. 135-FZ (latest revision). GARANT.RU informational-legal portal. URL: https://base.garant.ru/12148517/ (access date: 10.01.2024).

Ferreira, M. A., Schor, T., Medeiros, R., Rocha, S., Costa, E., Barbosa, E., 2024. Development of a sustainability index for the inland waterway transport of the Amazon. Observatorio de la economia latinoamericana 22, e3255.

Grosche, T., 2022. Airline Market Concentration in Europe.

Kostetska, N., Liakhovych, L., 2023. Methodological aspects of assessment the level of industry markets concentration. Galic'kij ekonomičnij visnik 84, 15–24.

Mironova, L., Ganieva, A., Rudaleva, I., 2022. The role of transport in the meanings of economics of Russia and the survey of economic indicators of transport of the Russian Federation. Transportation Research Procedia 63, 859-867. 10.1016/j.trpro.2022.06.083.

Paul, A., Niemeier, H.-M., Forsyth, P., 2023. European Hub Airport Competition: An Assessment of Market Concentration in the Local Catchment and in the Transfer Market.

Rozanova, N. M., 2023. Theory of sector markets: university tutorial in 2 vol. Vol. 2. Moscow: Yurayt.

Tserkovna, A., Rahimi, A., 2023. Inland water transport of Ukraine: problems and prospects. Market economy: modern management theory and practice 21, 498–522.

Zazdravnykh, A. V., Boytsova, E. Yu., 2023. Theory of sector markets: university tutorial. Moscow: Yurayt.