

Mariia Marchenko

4th year student

Specialization “Biotechnology and Bioengineering”

*Supervisor: Candidate of Economic Sciences, Associate Professor of the
Department of Management and Innovation Larysa Ivashko*

PECULIARITIES OF BIOTECHNOLOGICAL SECTOR DEVELOPMENT IN THE CONDITIONS OF WAR. ECONOMIC AND FINANCIAL ASPECTS

Europe has been blindsided by its biggest war in decades with Russia’s invasion of Ukraine. Amid a raging humanitarian crisis, the biotech industry is preparing for increasing economic uncertainty, cyber threats, and clinical trial disruptions.

Acceleration of innovative development, including on the basis of the introduction of high-tech production in all branches of the industrial complex, is a modern economic trend for developed countries. Biotechnology is defined priorities for the coming decades in the forecasts of the World Bank, the Organization for Economic Cooperation and Development, the World Economic Forum, etc. Relatively low effectiveness of implementation of national programs aimed at the development of innovative biotechnologies, as well as uncertainty from a theoretical and methodological point of view regarding the formation of an organizational and economic mechanism for ensuring the development and commercialization of biotechnologies in Ukraine significantly slows down the formation of the sixth technological order and does not allow to quickly and effectively increase competitiveness and investment attractiveness of the state in the world and to reform it basis of the Ukrainian economy as a whole [2].

In 2018 Duncan B Judd of the consulting firm Awridian in collaboration with researchers from Ukraine, Latvia, and France conducted a survey of the market for high-throughput screening compounds used in drug discovery. They concluded that companies in Ukraine and Russia, with the largest of them being Enamine, supply around 80 % of the world's screening compounds for high-throughput screening programs. "I'm not sure people realize the scale of the problem," Duncan B Judd tells C&EN commenting on possible consequences of the invasion of Ukraine "It's going to make a big impact" [9].

The unexpectedly tangible role, which Ukrainian chemical suppliers, like Enamine, play in the global pharmaceutical research, hit headlines of leading biopharmaceutical and mainstream media outlets, including Endpoints News, Stat news, Fierce Pharma, C&EN, Bio Century, Chemistry World, The Wall Street Journal, Bloomberg, and others [4].

It appears that not only early drug discovery programs are going to be affected by the war in Ukraine –according to a prestigious British magazine WIRED, Ukraine had a reputation as a hub for clinical trial until Russia invaded. The country possesses a sizable, capable medical and research workforce with a reputation for delivering reliable data, while recruitment of patients in Ukraine is believed to be easier, compared to some Western countries. The Ukrainian government recently overhauled its medical system to introduce a national digital records system, adding to Ukraine's attractiveness as a global clinical trials destination [1].

At the end of February 2022, Clinicaltrials.gov listed as many as 635 ongoing interventional trials in various recruiting and enrollment stages with at least one study site in Ukraine including studies in the recruiting stage. Another resource, Global Clinical Trials, estimates a smaller but still considerable number of clinical trials in Ukraine – around 500 studies every year. Not only small and medium biotechs, but also big pharma companies are among trial sponsors, meaning the negative effect of war on biotechnological research will be felt across the industry and, potentially, long into the future [7].

The war led to a severe decline in the Ukrainian economy, causing a significant increase in the budget deficit, and critical dependence

of the Ukraine's economy on international aid. In June/July 2022, more than 50 % of the deficit was covered by financial assistance from international partners. However, the International Monetary Fund estimates that the GDP decline may reach the level of 33–35 % by the end the year and predicts a significant increase in public debt to more than 85 % of the GDP [3]. Moreover, Ukraine is facing high rates of inflation. The National Bank of Ukraine predicts that by the end of the year prices may rise by at least 30 %. Research conducted in Ukrainian biotechnology in particular pharmacy showed a 20–25 % increase in prices, and in some of them it was up to 60 % [5]. The experts predict even further increase. It is noteworthy that in the same time, salaries in private sector companies and enterprises decreased by 10 %–50 % as compared to the pre-war period. All these factors have profound consequences for maintenance of long-term therapies, as higher costs of medicines reduce their affordability [6].

The factors that play the main role in the rapid increase in drug prices are, among others, more difficult logistics due to current shutting off of air and sea transport routes, as well as destruction of many warehouses storing medications and raw materials by the Russian invaders. Unlike in the pre-war period, delivery of these raw materials now takes months or more. It should be emphasized that up to 75 % of the drugs distributed in Ukrainian biotechnology are produced locally. However, almost all raw materials for drug manufacturing, which have become more expensive all over the world, are imported. Another problem is a higher USD to UKH (Hryvna, Ukrainian currency) exchange rate, as well as growing prices and shortage of fuel [10].

Consequently, since March 2022 sales in the Ukrainian biotechnology market have dropped significantly – by 11% in March, by 32% in April and by 24% in May and June as compared to the same period of 2021. The reasons for sales decline are directly related to the war, i.e. massive migration from the country, the occupation of specific Ukrainian regions, the considerable medical humanitarian aid provided by other countries, and drop in the income of the population that began to choose less expensive drug analogues to save on medications [8].

The gradual improvement of key macroeconomic indicators in Ukraine suggests a recovery in the economy. Currently, the key trends in the pharmaceutical market are conducive to investing, although they carry a number of threats. Investments will give an impetus to increase production volumes, expand the range of generics and OTC, develop entrepreneurial activity, and increase the competitiveness of national companies.

References

1. Amrakhov P. Risk management aspects, war and further perspectives in clinical trials in Ukraine. *Economics, Finance and Management. Review*. 2023. Vol. 1. № 13. P. 80–97. URL: <https://doi.org/10.36690/2674-5208-2023-1-80> (date of access: 19.04.2024).
2. European Commission. URL: <https://ec.europa.eu/>
3. Kirsanov D. War and medicines: Pharmacy sales according to the results of the first half of 2022. 2022. URL: <https://www.apteka.ua/article/641331> (date of access: 19.04.2024).
4. Kondratov I., Moroz Y., Grygorenko O., Tolmachev A. The Ukrainian Factor in Early-Stage Drug Discovery in the Context of Russian Invasion: The Case of Enamine Ltd. : *ACS Med. Chem. Lett.* 2022. Vol. 13. P. 992-996. URL: <https://doi.org/10.1021/acsmchemlett.2c00211> (date of access: 19.04.2024).
5. Kupriianova O. Why the medicines prices are rising rapidly in Ukraine and is there a predicted shortage of medicines. 2022. URL: <https://1plus1.ua/tsn/novyny/comu-v-ukraini-strimko-rostut-cini-na-likhi-ta-ci-prognozue-tsa-deficit-medicnih-preparativ-suzet-tsn> (date of access: 19.04.2024).
6. Murashko A. Ukraine, drug prices in pharmacies have increased by 20–40 %. 2020. URL: <https://www.unn.com.ua/uk/news/1979132-v-ukrayini-tsini-na-likhi-v-aptekakh-zrosli-na-20-40> (date of access: 19.04.2024).
7. Rubens D. Beyond 'command & control': Developing a new paradigm for incident command systems, critical decision-making and 21st century crisis response. 2015. [Doctoral thesis, University of Portsmouth]. ProQuest Dissertations Publishing (date of access: 19.04.2024).
8. Ternova S. Petro bagrii: "The national farm is a treasure of the state, and not only in difficult times". 2022. URL: <https://thepharma.media/uk/business/29975-petr-bagrii-otecestvonnaya-farma-klad-gosudarstva-i-ne-tolko-v-trudnye-vremena-03082022> (date of access: 19.04.2024).
9. Volochnyuk D. M., Ryabukhin S. V., Moroz Y., Savych O., Chuprina A., Horvath D., Judd D. B. Evolution of commercially available compounds for HTS. *Drug Discovery Today*. 2018. Vol. 24. № 2. URL: <https://doi.org/10.1016/j.drudis.2018.10.016> (date of access: 19.04.2024).
10. Zanuda A. Dollar at 36.6 and new restrictions on operations abroad. Why did the NBU made changes? URL: <https://www.bbc.com/ukrainian/news-62254553>(date of access: 19.04.2024).