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MODEL IMPACT OF ECONOMIC ASYMMETRIES ON THE DEVELOPMENT OF GLOBAL INDUSTRIAL GIANTS

МОДЕЛЬНИЙ ВПЛИВ ЕКОНОМІЧНИХ АСИМЕТРІЙ НА РОЗВИТОК СВІТОВИХ ПРОМИСЛОВИХ ГІГАНТІВ

Abstract. *The study emphasizes that economic asymmetries arise not only due to the uneven distribution of economic resources among countries, regions, or sectors but also due to a range of other factors, including unequal access to natural resources, differences in the level of technological development, limited financial capabilities, uneven infrastructure development, and more. At the same time, these factors have a polarizing effect on the development of global industrial giants, creating both obstacles and favorable conditions for their dominance in international markets, accelerating or decelerating growth, and leading to either concentration or dispersion of capital. Thus, understanding the specific impact of economic asymmetries on the development of global industrial giants is crucial from both an operational and strategic perspective, as it enables analysis of how the distribution of resources, technologies, infrastructure, investments, and other factors influences current and future profits. The aim of the study is to identify the specific features of analyzing the impact of economic asymmetries on the development of global industrial giants by modeling the key factors that determine the uneven distribution of resources, market opportunities, and regulatory constraints. The study results demonstrate that the impact of economic asymmetries on the development of global industrial giants is determined by the advantages they gain from leveraging the unevenness or imbalance in the distribution of economic resources, opportunities, and outcomes across countries, regions, and sectors. It has been proven that economic asymmetries contribute to: reducing extraction costs through the benefits of resource monopolization, optimizing production scales, accessing financial and technological resources, and lowering production costs due to insufficient regulation. It has been proven that the impact of economic asymmetries on the development of global industrial giants can be modeled using a multiple regression equation. This approach allows for: evaluating the utilization of unevenness or imbalances in favor of corporations, which shape the outcome indicator (Y) manifested as superprofits; accounting for the interaction between elements of unevenness or imbalances, including complex cause-and-effect relationships that can be quantitatively assessed.*

Keywords: *technologies, infrastructure, investments, imbalance, production scale, production costs, weak regulation.*

Анотація. *У межах дослідження підкреслено, що економічні асиметрії виникають не лише через нерівномірний розподіл економічних ресурсів між країнами, регіонами чи галузями, а й через низку інших чинників, серед яких: нерівномірний доступ до природних ресурсів, відмінності в рівні технологічного розвитку, обмежені фінансові можливості, нерівномірний розвиток інфраструктури тощо. Водночас зазначені чинники мають полярний вплив на розвиток світових промислових гігантів, створюючи як перешкоди, так і сприятливі умови для їх домінування на глобальних ринках, прискорення або уповільнення зростання, концентрації або розпорошення капіталу. Таким чином, розуміння специфіки впливу економічних асиметрій на розвиток світових промислових гігантів є важливим як з операційної, так і зі стратегічної точки зору, оскільки дозволяє аналізувати, як розподіл ресурсів, технологій, інфраструктури, інвестицій та інших факторів впливає на поточні та перспективні прибутки. При цьому метою дослідження є визначення особливостей аналізу впливу економічних асиметрій на розвиток світових промислових гігантів шляхом моделювання ключових факторів, що визначають нерівномірний розподіл ресурсів, ринкових можливостей та регуляторних обмежень. За результатами дослідження доведено, що вплив економічних асиметрій на розвиток світових промислових гігантів визначається перевагами, які вони отримують завдяки використанню нерівномірності або дисбалансу в розподілі економічних ресурсів, можливостей і результатів серед країн, регіонів та секторів. Доведено, що економічні асиметрії сприяють: зниженню вартості видобутку завдяки вигодам від монополізації ресурсів, оптимізації масштабів виробництва, доступу до фінансових і технологічних ресурсів, а також зниженню виробничих витрат через недостатнє регулювання. Доведено, що вплив економічних асиметрій на розвиток світових промислових гігантів можна змоделювати за допомогою рівняння множинної регресії. Це дозволяє: 1) оцінити використання нерівномірностей або дисбалансів в інтересах корпорацій, що формують результативний показник (Y), проявлений у вигляді надприбутків; 2) врахувати взаємодію між елементами нерівномірностей або дисбалансів, зокрема складні причинно-наслідкові зв'язки, які можна кількісно оцінити.*

Ключові слова: *технології, інфраструктура, інвестиції, дисбаланс, масштаби виробництва, виробничі витрати, слабке регулювання.*

Problem statement. The study emphasizes that economic asymmetries arise not only from the uneven distribution of resources between countries, regions, or industries but also as a result of several other factors, including unequal access to natural resources (oil, gas, minerals); differences in technological development levels (digitalization, innovation); limited financial capabilities (investment capacity, access to credit); uneven development of infrastructure (transport and logistics networks), and more. At the same time, these factors differ in their impact on the development of global industrial

giants, creating both obstacles and favorable conditions for their dominance in global markets, accelerating or slowing growth, and concentrating or dispersing capital. Thus, understanding the specifics of the impact of economic asymmetries on the development of global industrial giants becomes crucial from an operational and strategic perspective, enabling the analysis of how the distribution of resources, technologies, infrastructure, investments, and other factors will affect current and future profits.

Analysis of research and publications. The formation of economic asymmetries in the global economy and the issues of their impact on the development of global industrial giants have been studied in the works of Balėžentis A., Yatsenko O.A. [2], Kravchuk N.Y. [4], and Hadjiyiannis C. [6]. At the same time, most researchers have studied the aspects of the uneven distribution of economic resources, opportunities, and outcomes among different countries and regions, as well as the mechanisms through which these inequalities affect the activities of global industrial giants. Also, H.V. Duhinets [3] in research emphasized that economic asymmetries create both opportunities and challenges for the development of global industrial giants, forming unequal conditions in global markets.

At the same time, the issue of modeling the impact of economic asymmetries on the development of global industrial giants has remained outside the focus of researchers. Economic asymmetries are formed under the influence of numerous factors, such as access to resources, level of regulation, technological capabilities, scale of production, political stability, and so on. Taking these factors into account in a single model is, according to most researchers, a rather complex task.

The purpose of the article. The aim of the research is to highlight the features of studying the impact of economic asymmetries on the development of global industrial giants by modeling the key factors that determine the uneven distribution of resources, market opportunities, and regulatory constraints.

Presentation of the main material. Global industrial giants are large corporations that hold leading positions in their industries due to significant capital, technological innovations, extensive production and logistics networks, as well as global market reach [1]. These companies typically operate at the international level and have a significant influence on the global economy or the economies of individual countries and regions. Among such industrial giants are: in the technology sector – Apple, Microsoft, and Samsung; in the mining industry – ExxonMobil, BHP, and Rio Tinto; in the automotive industry – Toyota, Volkswagen, and Tesla; in the consumer sector – Nestlé, Procter & Gamble, Unilever. According to data from the OECD (Organisation for Economic Co-operation and Development) and the UN (UNCTAD), it is evident that economic asymmetries significantly impact the development of global industrial giants, creating both favorable conditions for their growth and challenges they must overcome (as confirmed by OECD reports on income inequality and global supply chains, UNCTAD's "World Investment Report", etc.).

The impact of economic asymmetries on the development of global industrial giants is shaped by the advantages they gain through the use of unevenness or imbalance in the distribution of economic resources, opportunities, and outcomes among different countries, regions, and sectors. In particular, economic asymmetries contribute to [5-6]:

1. (X1) Reduced extraction costs due to the benefits of resource monopolization;
2. (X2) Optimization of production scales;
3. (X3) Access to financial and technological resources;
4. (X4) Reduction of production costs through weak regulation.

It can be stated that the impact of economic asymmetries on the development of global industrial giants can be modeled (through a multiple regression equation), considering that [6]:

1. The potential exploitation of discrepancies or imbalances that benefit corporations. It influences the outcome variable (Y), which manifests as excess profits.
2. The interaction of uneven elements and imbalances can be quantitatively assessed.

For example, for global giants in the mining industry, such an equation would look like:

$$Y = 11.6401 + 1.3164X_1 - 0.3023X_2 + \\ + 4.1404X_3 - 0.9108X_4.$$

The input data for modeling the impact of economic asymmetries on the development of global mining giants is presented in Table 1.

The constant estimates the aggregated impact of other factors (apart from those studied in the model, X_i) on the outcome Y and indicates that Y, in the absence of X_i in 2023, amounted to 11.6401 billion USD.

The interpretation of the model's impact of economic asymmetries on the development of global industrial giants can be presented as follows:

1. An increase in the benefits from resource monopolization by 1 billion USD leads to an increase in global mining giants' profits (Y) by 1.463 billion USD. In other words, the greater the concentration of monopoly rights over natural resources, the higher the profit for corporations.

2. An increase in the benefits from economies of scale by 1 billion USD leads to an average decrease in profits of global mining giants (Y) by 1 billion USD. It is because an increase in scale may be accompanied by significant investments in infrastructure and production capacity, which at certain stages can result in cost growth that exceeds the potential advantages of economies of scale.

3. An increase in access to financial and technological resources by 1 billion USD leads to an average increase in the profits of global mining giants (Y) by 9.372 billion USD. Technological and financial resources enable corporations to

Table 1 – Input data for modeling the impact of economic asymmetries on the development of global mining giants for 2019–2023, billion USD

Observation period	Profits (Y)	Benefits from resource monopolization (X1)	Benefits from economies of scale (X2)	Benefits from access to financial and technological resources (X3)	Benefits from reduced production costs due to weak regulation (X4)
2019	18	4.8	8.3	1.3	3.11
2020	19.1	6	8	1.6	5.1
2021	18.4	5.8	9.5	2	6.9
2022	17.35	5.5	8.9	1.6	6
2023	16.5	4	5.7	1.66	6.1

Source: compiled from OECD data

implement cutting-edge technologies and automate production processes, reducing costs and increasing production efficiency, which ultimately boosts their profits.

4. An increase in production costs due to strict regulation by 1 billion USD leads to an average decrease in the profits of global mining giants (Y) by 1.885 billion USD. Strict regulation may require companies to incur additional costs to comply with standards, which reduces their profit margins. This increase in costs leads to a reduction in overall profits.

Based on the provided data, it is evident that the impact of economic asymmetries on the development of global industrial giants has a flexible nature. At the same time, based on the measurable numerical value of each of the factors outlined, which create this asymmetry, it is possible to sufficiently model its impact on the development of global industrial giants.

Indeed, it should be noted that in countries with abundant natural resources, their extraction is significantly cheaper [1–2]. This allows global corporations, such as ExxonMobil or BHP, to obtain large volumes of raw materials at a low cost. A typical example is the extraction of oil by these corporations in the Gulf countries or Africa, where the conditions for extraction are much more favorable than in other countries. Yes, if the cost of extracting a barrel of oil in Saudi Arabia is approximately $2–4 per barrel, while in Nigeria it ranges from $10–20 per barrel, then in the USA, Norway, and the UK it is $40–70 per barrel, as is clearly evident from the data in Table 2.

Thus, regarding such asymmetry as the benefits from resource monopolization, it should be noted that large industrial giants often seek to obtain preferential rights for resource extraction in countries with abundant natural resources (this is possible through long-term contracts or concessions) [5]. In particular, monopolization targets countries where valuable natural resources are located at shallow depths, ensuring cheaper extraction, as well as countries with low energy and infrastructure costs, allows for reducing overall extraction costs and increasing economic efficiency.

For example, TotalEnergies, the French oil company, holds a significant share in the development of oil and gas fields in Nigeria. In this region, the company has secured long-term contracts and concessions for oil and natural gas extraction, particularly in areas such as offshore platforms in the Nigerian Gulf. The Italian oil company Eni has exclusive contracts for the development of oil fields in Angola [5]. The company operates through joint ventures with local government entities, which allows it to control a significant portion of oil extraction.

Petrobras, a state-owned oil company in Brazil, holds a monopoly on oil extraction in the country's offshore fields [5]. However, major international companies such as Shell, ExxonMobil, and Chevron also have a significant influence on the market, as they participate in joint ventures and obtain exclusive rights to extract from certain fields [5].

China National Petroleum Corporation (CNPC), the Chinese oil corporation, gained access to significant oil resources in Sudan through long-term contracts with the country's government.

These examples (see Table 3) illustrate how large corporations, through long-term contracts and concessions, gain monopolistic access to natural resources in countries with

Table 2 – Comparison of oil extraction costs in countries with low levels of economic development

Country/Region	Oil extraction cost	Features
Gulf countries	$2–4 per barrel	Cheap drilling, low labor costs, low energy costs
Africa (Nigeria, Libya)	$10–20 per barrel	Lower environmental requirements, low labor costs
USA (Shale oil fields)	$40–60 per barrel	Challenging extraction conditions, high environmental standards
Norway, United Kingdom	$40–70 per barrel	High technological and environmental requirements, deep drilling

Source: compiled from OECD data

Table 3 – Characteristics of examples of large corporations gaining exclusive rights to extract natural resources in resource-rich countries

Examples of exclusive rights to extract natural resources in resource-rich countries	Characteristics of the nature of exclusive rights to extract natural resources	Advantages of exclusive rights to extract natural resources
Total Energies holds a significant stake in the development of oil and gas fields in Nigeria.	The company secured long-term contracts and concessions for oil and natural gas extraction, particularly in areas such as offshore platforms in the Nigerian Gulf.	The cost of oil extraction in Nigeria is among the lowest in the world, allowing TotalEnergies to generate substantial profits. TotalEnergies holds significant political influence due to its investments in the oil sector.
The Italian oil company Eni has exclusive contracts for the development of oil fields in Angola.	The company operates in the country through joint ventures with local government entities.	Angola is one of the largest oil-producing countries in Africa, and a significant portion of its oil is extracted under international agreements, particularly with Eni, which has special agreements with the government.
Shell and ExxonMobil participate in joint ventures and obtain exclusive rights to extract certain fields in Brazil.	The companies have rights to develop some of the largest oil fields in the offshore zones of Brazil.	Brazil offers the most profitable extraction in advanced deepwater fields, such as the Pre-Salt Block, which provides access to enormous oil reserves.
China National Petroleum Corporation (CNPC), the Chinese oil corporation, gained access to significant oil resources in Sudan.	The company gained access to significant oil resources in Sudan through long-term contracts with the country's government. It actively invests in the oil sector and refining capacities.	CNPC holds extraction rights in several oil fields in Sudan, allowing it to monopolize access to these resources and ensure oil supply to China, its main consumer.

Source: compiled from OECD and [5] data

abundant reserves but low levels of economic development or unstable political situations.

Monopolization of access to natural resources allows global industrial giants to maximize profits and control a significant portion of the world's resource supplies.

Regarding the asymmetry related to reduced production costs due to weak regulation (for example, in countries such as Nigeria, Venezuela, Libya, Colombia, Congo, Mozambique), it is evident that this allows large industrial giants to conduct extraction with lower costs for environmental standards, labor protection, and safety compared to industry averages [4–5].

In countries with less stringent standards or weak enforcement of regulations, corporations can significantly reduce costs related to environmental measures, such as waste disposal, pollution minimization, or adherence to safety standards (Table 4).

Since the costs of complying with environmental norms and standards are low, this allows companies to retain more funds for other uses – such as expanding production, increasing investments, or paying dividends [5–6]. Such savings create superprofits, and their recipients gain a significant competitive advantage in the market (due to lower costs compared to competitors operating in countries with stricter environmental regulations [7]).

Regarding the asymmetry associated with access to financial and technological resources, it is important to note that global industrial giants actively invest in cutting-edge technologies to reduce costs, increase productivity, and improve the environmental efficiency of extraction processes [3–4].

For example, ExxonMobil and Shell have access to advanced technologies (such as automated drilling rigs, remote monitoring and control of extraction processes, energy consumption management systems, 3D/4D seismic surveys, etc.), which allow them to reduce extraction costs. At the same time, many local businesses in resource-rich countries lack such technological capabilities, giving global industrial giants a significant advantage [3].

Regarding the asymmetry related to economies of scale, it should be noted that large industrial giants can leverage them to reduce average costs per unit of production [3].

Economies are achieved through significant volumes of production or extraction, which allow fixed costs to be spread across a large number of units, as well as optimizing other costs such as logistics, equipment procurement, energy consumption, and other operational expenses.

For example, BHP Billiton, one of the largest global mining giants, extracts minerals such as iron ore, coal, and copper in several countries across the globe, including Australia, Chile, and Canada. Because of the large scale of production, the company can lower the average cost per unit of output, as detailed in Table 5.

The nature of the asymmetry that forms economies of scale lies in its ability to allow large industrial giants to reduce costs, optimize processes, and maintain competitive advantages in the market.

Conclusions. The research findings demonstrate that the impact of economic asymmetries on the development of global industrial giants is determined by the advantages companies gain through the use of disparities or imbalances in the distribution of economic resources, opportunities,

Table 4 – Examples of countries shaping the impact of economic asymmetries on the development of global industrial giants

Country	Characteristics of the activities of global industrial giants	Environmental Standards
Nigeria	It has the largest proven oil reserves in the world. Specifically, oil fields in the Orinoco region are strategically important for international oil and gas corporations.	The country faces challenges in enforcing environmental regulations. There is often insufficient control over the environmental consequences of oil extraction, allowing companies to minimize costs related to environmental protection measures*
Venezuela	One of the major oil-producing countries on the African continent. The country's oil industry attracts international companies due to its large oil reserves.	In conditions of political and economic instability, environmental regulations for oil and gas extraction in the country are often less stringent, allowing extraction companies to reduce costs related to environmental protection and safety**
Libya	One of the major oil-producing countries on the African continent. The country's oil industry attracts international companies due to its large oil reserves.	In Libya, due to political instability, there are issues with effective enforcement of environmental and safety standards, allows international corporations to reduce costs related to labor protection and environmental conservation***
Colombia	It is an important player in the coal and oil extraction market in South America. The country actively collaborates with international corporations.	In Colombia, environmental standards are significantly lower compared to those in developed countries. Companies have the opportunity to conduct extraction with lower costs for environmental safety and face fewer labor protection requirements****
Congo	It is one of the largest countries in Africa extracting minerals and natural resources, including coltan, copper, cobalt, and others.	Congo is characterized by weak control over environmental and labor standards. This allows companies to reduce costs related to compliance with environmental regulations and safety measures*****

*Note: *Environmental issues, such as oil spills in the Niger Delta, lead to serious ecological disasters, but this does not stop extractive companies as environmental safety requirements are less stringent.*

***Several international companies, such as Chevron and Eni, operate in Venezuelan oil fields, benefiting from the ability to reduce costs due to more lenient environmental regulations.*

****There is a lack of proper monitoring of the environmental situation in the country, and workers' rights are often violated at extraction sites.*

*****Colombia faces issues with illegal mining and human rights violations in extraction areas, allowing international companies to operate in a less regulated environment.*

******Due to the lack of effective state control, international corporations can exploit resources with lower environmental protection costs.*

Source: compiled from OECD and [4–5] data

Table 5 – The Impact of Economies of Scale on the Development of BHP Billiton

Direction of Economies of Scale	Manifestations of Economies of Scale in Production	Characteristics of Economies of Scale Formation
Optimization of extraction costs	Due to large volumes of extraction in various regions, BHP can reduce costs on equipment, personnel, and other operational resources.	Larger volumes of extraction allow for investment in cutting-edge technologies that automate processes and reduce labor costs.
Logistics and transportation	BHP can leverage large volumes to optimize logistical costs.	To transport large volumes of resources using their own or leased vessels and rail routes, businesses achieve a reduction in transportation costs per unit of product.
Diversification of assets	BHP's operations are spread across different continents, allowing them to reduce risks associated with political or economic instability in one region.	If one market becomes less profitable due to falling resource prices or changes in environmental regulations, a business can offset these losses by more profitable operations in other regions.

Source: compiled from OECD and [5–6] data

and outcomes among countries, regions, and sectors. The findings allow for the following conclusions:

1. Economic asymmetries contribute to reducing extraction costs through the benefits of resource monopolization, optimizing production scales, access to financial and technological resources, and lowering production costs due to weak regulation.

2. The impact of economic asymmetries on the development of global industrial giants can be modeled using a multiple regression equation. It allows: 1) to assess the use of disparities or imbalances in the interests of corporations that shape the outcome indicator (Y), manifested as superprofits; 2) to account for the interaction between elements of disparities or imbalances, including complex cause-and-effect relationships that can be quantitatively assessed.

3. The use of the model allows for a scientific justification of the mechanisms through which economic asymmetries impact the activities of global industrial giants, which is crucial for developing strategies for economic regulation at the global level.

The prospects for further research lie in deepening the analysis of the impact of economic asymmetries on the formation of excess profits by global industrial giants and developing regulatory tools to reduce global imbalances.

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