Competitiveness and industrial progress: a political-economic analysis

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Abstract. The paper concerns with political and economic aspects of ensuring competitiveness in the conditions of forming a technocratic economy. Nowadays, the level of the applied technology ensures competitiveness. This level depends on both the innovation process cost, associated with R&D activities, and the result-oriented phase, determined by the industrialization of the national economy. This justifies the leading role of industrial progress in ensuring the technical and technological modernization of the national economy and, accordingly, increasing its competitiveness. The paper provides detailed political-economic and engineering characteristics of the main stages of industrialization. Therefore, the digital transformation of the economy and society is a modern stage of industrial progress associated with the introduction and use of technical devices with digital control. However, there is an underestimation of the importance in the modern domestic theory and practice of industrialization as the main driver of technical and technological progress. The authors propose a quantitative indicator which makes it possible to objectively evaluate and compare the levels of technological progressivity of various countries. On the basis of this indicator, we reveal a critical delay of Belarus and Russia from strategic competitors in the field of equipment and technology. Meanwhile, it is a serious threat to their economic and national security. Nowadays, formation and active implementation of the strategy of neo-industrialization (new digital industrialization) is the main direction of increasing the level of technological progressivity and competitiveness of socio-economic systems. Also we provide the general recommendations to improve the technical and technological equipment of the economy of the Union State of Russia and Belarus and, as a result, their economic and national security.

Keywords: competitiveness; technical and technological progress; research and development; industrialization; science intensity of GDP; the level of technological progressiveness of the national economy.

JEL codes: O25, O32

For citation: Tatyana Y. Goraeva & Valery F. Baynev. (2023). Competitiveness and industrial progress: a political-economic analysis. *Journal of regional and international competitiveness*, 4(2), 4.

Introduction

Evidently, one of the most effective ways of defeating competitors is the ability to steer them down a false path of development. The most obvious example of such a way of competitive struggle is the collapse of the USSR. Apparently, the country, an invincible superpower that possessed huge natural and human resources, a huge army, and powerful special services, collapsed during the so-called market democratic reforms, which were carried out according to the directives «kindly» provided by our Western «partners».

Another extremely dangerous, in our opinion, is the concept of post-industrialism (post-industrial society) imposed on the peripheral world. It emphasizes the key role of the service economy, and downplays the importance of the material sphere, in particular industrial production. By introducing the so-called «post-industrial doctrine» into the minds of local elites, technologically developed countries encourage their competitors to deindustrialize, deliberately reducing their industrial and technological potential. It ultimately leads to the reducing of the competitiveness.

However, historical facts (for instance, the Industrial Revolution of the 18th-19th centuries in Great Britain, which allowed it to create the global British Empire; the Soviet industrialization of 1928-1941; the ongoing industrialization of the new China; the current fourth industrial revolution in Western countries,

etc.) convincingly demonstrate the foundation of global competitiveness for a national economy is provided by the industrial progress. It associated with the production and widespread use of advanced civilian and military technologies. Considering this phenomenon through the political economy aspect substantiates the key role of industrialization in increasing the level of technological progress and, as a consequence, the global competitiveness of the national economy.

Hence, considering the unprecedented complexity of the geopolitical and economic situation in the Union State of Russia and Belarus, today for both our countries it is not the transition to the post-industrial economy, but new (digital) industrialization – neo-industrialization (Gubanov, 2012; 2023). In the conditions of the technological embargo of the West, only digital industrialization will allow saturating the Union economy with advanced domestic technologies with digital control and thereby not only increase its competitiveness, but also ensure technological, economic and national security of the Union State.

Main part

Today, the digital economy and the digital transformation of the economy and society is discussed broadly (Gordeev & Shkiotov, 2019; Makarov & Lugachev, 2019; Sklyar & Kudryavtseva, 2019). However, the phenomenon of digitalization is often discussed only superficially, without proper political and economic analysis and, as a rule, in isolation from the evolution of the technologies. In our opinion, many experts oversimplify digitalization, identifying it with the emergence of a post-industrial economy in which services are assumed to be completely dominant. Meanwhile, industrial production is relegated to the background and becomes practically an anachronism. Therefore, a certain «stereotype» has been formed. It claims the post-industrial society has «the priority has shifted from mainly the production of goods to the production of services, and information and knowledge become the dominant production resources» (Zakhodyakin, 2008).

We consider information and knowledge as indeed crucial for competitiveness, but only if they are implemented in advanced materials, technologies, production methods, etc. Therefore, information and knowledge have always been significant for ensuring competitiveness throughout the evolution of humanity. In fact, even in primitive tribes who managed to implement their knowledge and skills in better tools and weapons gained significant advantages over their competitors. The same refers to other historical periods - the ancient world, the Middle Ages, and the present. Obviously, at all times, however important information and valuable knowledge are, without practical and useful realization, any resources expended will be simply useless. The essence of the resource-utilitarian approach to the study of socio-economic processes that we are developing (Sklyar & Kudryavtseva, 2019) is based on this irrefutable fact. It is the basis of our research.

We believe the digital economy is simply another (modern) stage in the evolution of technology and technological progress, which is increasingly, realized through digital control devices. V.G. Gordeev and S.V. Shkiotov (2019) consider «the content of the category «digital economy», in political and economic terms, the manifestation of the objective law of the productive forces (tools and means of production, qualification of labour force, etc.) development at the modern stage and the peculiarity of this stage». Meanwhile, the essential characteristic of this period of the Earth civilization evolution is a large-scale process of integration of digitally controlled technical devices into all spheres of human life. However, the digital transformation of the economy and society should be considered as a modern stage of industrialization which began in the 18th century. In the most general sense, industrialization can be understood as an endless process of creating technical devices and widely equipping all spheres of human life with them (Table 1). Moreover, industrialization in China is also perceived as a continuous process, and its modern stage is called digital industrialization (Zhang & Baynev, 2021).

The enduring importance of industrialization is clearly demonstrated through the fact that Western economic philosophy also relies on the «industrial approach» as the basis for the human progress periodization. For example, within the framework of this approach, Western scientists distinguish the periods of the first, second, third, and fourth industrial (or industrial) revolutions (Schwab, 2016). Notably, Lenin-Stalin's industrialization played a crucial role in the fate of the pre-war USSR providing it with an industrial and technological base for the Great Victory, subsequent monumental scientific and technological achievements

(space exploration, laser technology, nuclear power, the second largest economy, the world's leading system of science and education, etc.) (Gordeev & Gordeev, 2012; Grishkov, 2023). Conversely, deindustrialization occurring during perestroika in the USSR and then in post-reform Russia became one of the most irrational phenomena of the 20th century. It eventually led to the collapse of the USSR and unprecedented complication of the geopolitical situation in some of its republics.

Table 1 – Political-economic and technical-technological analysis of the equipment and technologies evolution

Historical stage	Pre-industrial Era	Industrial Era			
		Heat Engineering Industrialization	Electrotechnical industrialization	Electronic technical industrialization	
				Analog stage	Digital stage
Basic type of energy	Non-converted energy (muscular energy of humans and animals, wind energy, water energy, etc.)	Thermal energy of the burned fuel	Power (energy) electricity used to transmit energy	Information electricity used for transmission, storage, transformation, etc. information	
Basic technical devices	Hand tools and simple mechanisms	Thermal engineering	Electrical engineering	Analog electronic technology	Digital electronic technology
Examples of technical devices	Shovel, axe, lever	Steam engine, gas lantern, steam hammer, kerosene lamp, etc.	Electric motor, electric lamp, electric heater, welding machine, electrolizer, etc.	Analog radio, TV, telephone, computer, etc.	Digital radio, TV, telephone, camera, computer (computer), etc.
Political and economic mission of technical devices	Chain hoist, horse-drawn transport, wind wheel, water mill	Partial replacement of human musculoskeletal energy, expansion of the production possibilities frontier	Massive replacement of human musculoskeletal energy, expansion of the production possibilities frontier	Total replacement of the of human musculoskeletal energy, the expansion of its production capabilities, the replacement of simple intellectual abilities of a person	Total replacement of the of human musculoskeletal energy, expansion of its production capabilities, large-scale replacement of human intellectual abilities

Source: composed by authors

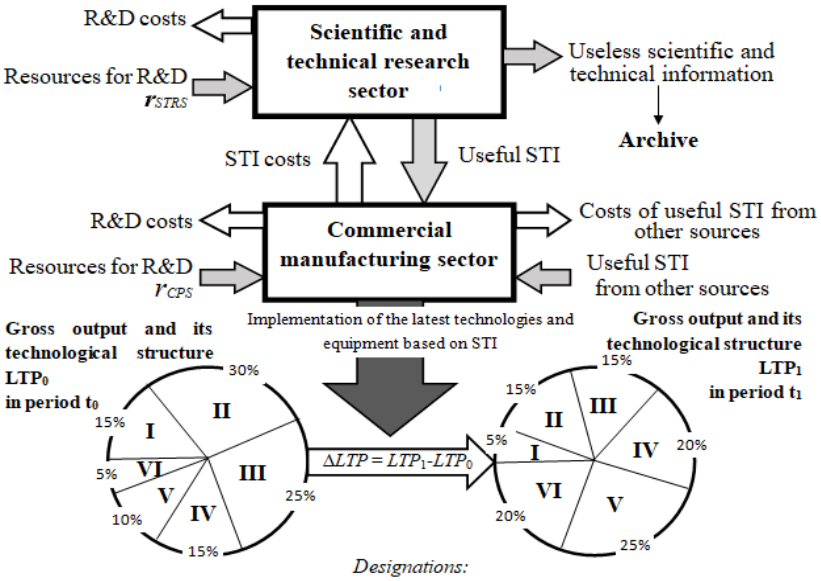
All mentioned above allows us to conclude that since the appearance of the first machines in the 18th century, the practical basis of competitiveness has been industrialization associated with their mass production and practical implementation. The essence of our resource-utilitarian approach is based on the assumption that any (biological, economic, social) system needs resources to maintain its integrity (i.e., to compensate entropy) and normal functioning. Indeed, there should be a fierce struggle for these resources. In this context, the competitiveness of an economic system is a state including active opposition of competitors even under unfavourable external conditions. It retains the ability to provide access to scarce (material, energy, financial, etc.) resources necessary for its self-preservation and performance of attributive functions within a specified life cycle.

Reasoning, we inevitably come to the following conclusion: the outcome of competition for limited resources has always and decisively depended on the technologies and techniques used by competitors, both civilian and military. An economic system's competitiveness, in other words, is to a large extent determined by the level of technology and engineering used in it. Since the production of technology is assigned to the industrial sector, the strategic directions for improving the competitiveness of the national economy are as follows:

- research and development (R&D), generating scientific and technological information (STI) and effectively translating it into advanced technologies and progressive machinery models realized by them;
- industrialization as a process of the mass production of advanced technologies with the aim of saturating all spheres of human life, increasing the level of technical and technological competence and, ultimately, improving the competitiveness of the domestic economy.

However, in the countries of the former USSR the attention of scientists is primarily focused on the sphere of research and development, assessed by R&D expenditures in it. Moreover, as a universal means of stimulating technical and technological progress of the national economy, a targeted increase in the science intensity of GDP, measured as the ratio of R&D expenditures to GDP, is prescribed (Bogdan, 2022; Goraeva, 2020). For example, in the Programme of Socio-Economic Development of the Republic of Belarus for 2021-2025, the main target indicator for the development of the scientific and technological sphere is a targeted «increase in R&D intensity in GDP to at least 1%» (currently this indicator is 0.47%)[1].

According to the resource-utilitarian approach to the study of socio-economic processes, R&D intensity is a typical cost indicator characterizing only the initial stage of the innovation process, namely the stage associated with costs. Nevertheless, the final useful result – increasing the overall level of technological development of the national economy – is a «product» of the industrial sector producing new technologies (fig. 1).



Designations:
STI - scientific and technical information; R&D - research and development work; LTP is the level of technological progress of the national economy;
I, II, III, IV, V, VI - contributions to the gross output of economic activities related to the first to sixth technological modes, respectively; ΔLTP is a change in the structure of gross output in favor of more high-tech types of economic activity (useful effect of scientific and technical activity);
r_{STRS} is the vector of resources spent on R&D in the scientific and technical research sector;
r_{CPS} is a vector of resources spent on R&D in the commercial (public and private) sector

Figure 1. The final useful result of scientific and technological activity

Source: composed by authors

As a quantitative measure of this level, we propose to use the indicator of the level of technological

[1] *The program of socio-economic development of the Republic of Belarus for 2021-2025. https://pravo.by/document/?guid=3871&p0=P32100292*

progressiveness of the national economy LTP («level of technological progress»), which represents the average level of technological progressiveness of economic activities forming the country's GDP. Academicians D. Lvov-S. Glazyev proposed the system of periodization of scientific and technological progress in accordance with the separation of the types of economic activities forming the country's GDP. Its value can be defined by the weighted average formula. By this formula, the ordinal numbers of technological patterns 1...6 act as options, and the weighting coefficients of these options are the shares in GDP of products belonging to the corresponding patterns. All required data for calculations can be easily found on the basis of domestic statistics. As a matter of fact, any other scale can be used, for example, from 1 to 4 – according to the number of industrial revolutions considered in Western economic philosophy. More detailed methodology for determining the level of technological progressiveness of the national economy, as well as the results presented in Figure 2, are described in our other publications (see, for example, Baynev & Goraeva, 2023).

In particular, these results show a significant difference between Belarus and Russia in terms of technological progressiveness of their economies and their strategic competitors. It poses a direct threat to the competitiveness of their national economies, especially in the current challenging environment.

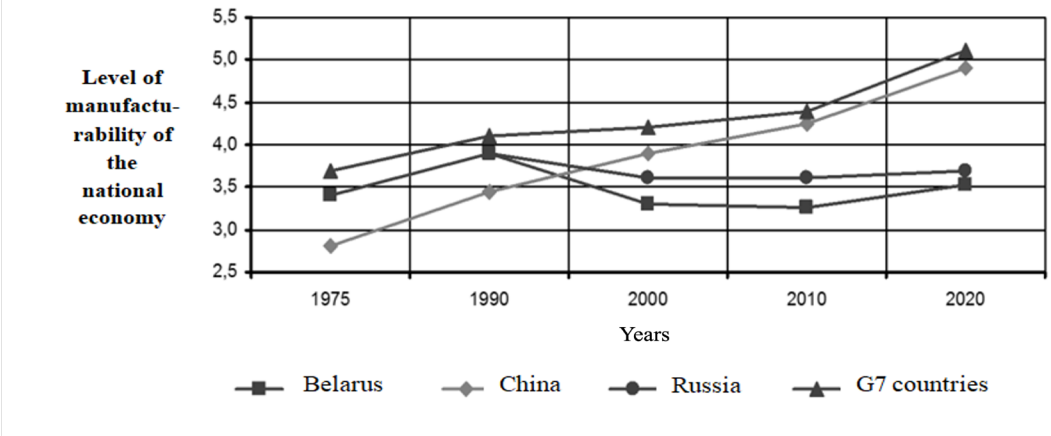


Figure 2. Dynamics of the indicator of technological progressiveness of national economies of some world countries, 1975-2020

Source: Baynev & Goraeva, 2023

Conclusions

In the context of intensified competition between countries and blocs for limited resources, improving competitiveness becomes the most urgent challenge. Under the conditions of technologically developed economy, the decisive factors of competitiveness are engineering and technologies. The paper reveals that technical and technological potential of the national economy is determined by two key phases of the innovation process. The first phase associated with research and development, which involves investment in R&D and the generation of new technological innovations. The second phase provides a real increase in the technical and technological level and, accordingly, the overall competitiveness of the national economy (or industrialization).

Evidently, competitiveness can be improved only if both phases – investment-intensive (R&D) and result-oriented (industrialization) – will be successfully implemented in the national economy. We propose to use the level of technological progressiveness of the national economy as an integral characteristic of the effective functioning of both phases. The distinctive feature of this indicator is the direct consideration of the final result of the innovation process – an increase in the share of high-tech economic activity in GDP. Its targeted increase will definitely indicate the growth of the technological level of production in the country and, as a consequence, an increase in its global competitiveness. Hence, our study allows us to substantiate two key trends in the current growth of domestic economic competitiveness:

1) intensification of domestic research and development, including increased investment in R&D and

stimulation of knowledge-intensive GDP (Shlychkov, 2022);

2) formation and active implementation of the neo-industrialization strategy (new digital industrialization) (Gursky et al., 2021), designed to become a practical mechanism for equipping all sectors and industries of the domestic economy with advanced technologies and digital management.

Finally, the results of our study have become particularly relevant when our countries faced severe restrictions in the acquisition of advanced technologies and products manufactured using them, or in the context of the current technological embargo imposed by Western countries against Belarus and Russia.

FUNDING

The work was done on a personal initiative.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTION

Tatyana Y. Goraeva – conceptualization, project administration, writing – original draft.
Valery F. Baynev – data curation, formal analysis, validation, writing – review & editing.

References

1. Baynev, V. F., & Goraeva, T. Yu. (2023). In Search of a Model of Safe Development: A Resource-Useful Approach to the Management of Scientific and Technical Progress. *Ekonomist*, (4), 44-52 (in Russian).

2. Bogdan, N. I. (2022). *To the question of indicators of innovative development in the conditions of modern challenges.* Minsk: Zakon i ekonomika (in Russian).

3. Goraeva, T. Yu. (2020). *High-tech sector of the economy: state, trends, mechanisms of formation and development.* Grodno: YurSaPrint (in Russian).

4. Gordeev, V. A., & Gordeev, A.A. (2012). The educational component of domestic industrialization. *Vestnik Kostromskogo gosudarstvennogo universitetaim im. N.A.Nekrasova,* (6), 40-43 (in Russian).

5. Gordeev, V. A., & Shkiotov, S. V. (2019). Digital economy from the position of theoretical economy. *Vestnik Tverskogo gosudarstvennogo universiteta. Seriya: Ekonomika i upravlenie,* (2), 250-253 (in Russian).

6. Grishkov, V. F. (2023). Soviet industrialization and its lessons for the present. *Ekonomika i upravlenie,* (2), 120-131 (in Russian).

7. Gubanov, S. S. (2012) *State breakthrough: neo-industrialization of Russia and verticalintegration.* Moscow: Knizhny Mir (in Russian).

8. Gubanov, S. S. (2023). Neo-industrialization as a guarantee of the stability of Russia and Belarus. *Gosudarstvennoe regulirovanie ekonomiki i povyshenie effektivnosti deyatel'nosti sub''ektov hozyajstvovaniya: sbornik nauchnyh statej XVII Mezhdunarodnoj nauchno-prakticheskoj konferencii, posvyashchennoj pamyati professora S. A. Peliha. Minsk, 20 aprelya 2023 goda.* Minsk: Akademiya upravleniya pri Prezidente Respubliki Belarus (in Russian).

9. Gursky, V. L., Solodovnikov, S. Yu., Sergievich, T. V., & Meleshko, Yu. V. (2021). *Modernization of the Belarusian industry in new technological and geo-economic conditions.* Minsk: Belorusskaya nauka (in Russian).

10. Makarov, V. L., & Lugachev, M. I. (2019). On the waves of digitalization.*Vestnik Moskovskogo universiteta. Seriya 6: Ekonomika*, (6), 3-8 (in Russian).

11. Schwab, K. (2016). *The fourth industrial revolution*. Moscow: Eksmo (in Russian).

12. Sklyar, M. A., & Kudryavtseva, K. V. (2019). Digitalization: main directions, advantages and risks. *Ekonomicheskoe vozrozhdenie Rossii*, (3), 103-114 (in Russian).

14. Zakhodyakin, I. V. (2008). Post-industrial economy - what does this concept mean in the modern world? *Kreativnaya ekonomika, 2*(1), 97-100 (in Russian).

15. Zhang, B., Baynev, V. F. (2021). *Industrial and technological progress of China: Chinese civilization on the way to the knowledge economy*. Minsk: Zakon i ekonomika (in Russian).

16. Shlychkov, S. V. (Ed.). (2022). *High-tech and science-intensive sector of the national economy:*

state and development prospects. Minsk: GU «BelISA» (in Russian).

Received 22.03.2023
Revised 19.04.2023
Accepted 26.04.2023