

Iryna Pidorycheva

Sector for Problems of Innovation and Investment Development in Industry,
Institute of Industrial Economics of National Academy of Sciences of Ukraine, Kyiv, Ukraine

E-mail: pidorycheva@nas.gov.ua

ORCID: <https://orcid.org/0000-0002-4622-8997>

ResearcherID: G-4597-2019

Vitaliy Omelyanenko

Sector for Problems of Innovation and Investment Development in Industry,
Institute of Industrial Economics of National Academy of Sciences of Ukraine, Kyiv, Ukraine

E-mail: omvitaliy@gmail.com

ORCID: <https://orcid.org/0000-0003-0713-1444>

ResearcherID: Q-6358-2016

The smart specialization approach through the prism of the key provisions of the theory of free trade: conclusions for Ukraine

Abstract

The purpose of the article is to analyze the approach of smart specialization through the prism of key provisions of D. Ricardo's theory of comparative advantage, to identify its limitations for industrial weak countries and on this basis to identify key guidelines for the development of smart specialization strategies in Ukraine in view of the challenges of the postwar era. *Materials and methods.* The study is based on theoretical works of Ukrainian and foreign scientists on the problems of implementing the approach of smart-specialization in the practice of regional development. The work was carried out using the methods of systematization and generalization, analysis and synthesis, comparative analysis, and systematic approach. *Results.* The theoretical basis of the approach of "smart specialization" is revealed, the synthesis of economic schools, theories and concepts underlying this approach is defined. The insufficient theoretical development of its main provisions, which is negatively reflected in practice, especially in less economically developed countries and regions, was substantiated. It is concluded that the reasons for this lie, in particular, in the limitations of the Ricardian theory, on the provisions of which the smart specialization approach is based. It is emphasized that the Ricardian theory does not take into account the technological factor, which considers the technological base of the country as a constant, which does not give industrial weak countries an opportunity to change the raw material nature of their economy to a fundamentally new – innovative one. The historical retrospective traces the strategy of development of economically powerful countries in achieving their international competitive advantages, which is diametrically opposed to Ricardian theory. On the basis of this the key guidelines for the development of strategies of reasonable specialization in Ukraine in the post-war period of its reconstruction in order to prevent the preservation of the raw material nature of the national economy and its secondary position in the world are outlined. *Conclusion.* It is proved that post-war reconstruction of Ukraine should be aimed at radical changes in the structure of the economy, the transition from the agrarian-raw type to industrial-innovative type on the basis of creating a modern high-tech industry in the conditions of unfolding in the world of a new technological revolution.

Keywords

smart specialization, strategies of smart specialization, theory of comparative advantages, technological base of the country, industry, innovative nature of the economy, Ukraine, post-war period

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1 Introduction

As defined by the European Commission, smart specialization is an innovative approach aimed at stimulating economic growth and job creation in

Europe by enabling each country and/or region to identify and develop its own competitive advantages (European Commission, 2017). It is implemented through Smart Specialization Strategies (S3), which in 2012 were reinterpreted as Research and Innova-

tion Strategies for Smart Specialization (RIS3). Currently, these concepts are used as equivalent.

The main methodological provisions of this approach were formulated by a group of experts of the European Union (EU) in 2007–2009 (D. Foray, B. van Ark, P. David, B. Hall), since then the smart specialization approach quickly gained popularity and spread throughout the EU and far beyond it, as evidenced in particular by the program documents of the OECD and the UN. In fact, the idea of smart specialization "was not something entirely new," it "had been in the air for a long time-as its authors point out-but perhaps all that needed to be done was to give it academic legitimacy" (Foray, David & Hall, 2011, pp. 4, 6). The essence of the "smart specialization" approach is simple and obvious: first, regions cannot work in all areas of science, technology, and innovation, and second, they must promote what will make their knowledge base unique and better than others. In view of this, taking into account the shortcomings of previous regional innovation strategies and the generally low level of innovativeness of Europe compared to its global competitors, primarily the USA and Japan (Commission of the European Communities, 1996), the European Commission implemented RIS3 in the Cohesion Policy for 2014–2020 in within the framework of the EU strategy "Europe 2020" as a "precondition" for EU member states and their regions in receiving financial support from structural funds for research and innovation (Foray et al, 2012). However, as practical experience shows, the implementation of the smart specialization approach in the EU has not yet ensured its equal impact on different types of regions. Some regions find it more difficult than others to achieve results and identify promising areas of smart specialization, organize the process of entrepreneurial discovery, and successfully implement smart specialization strategies (Benner, 2019). As a result, inequalities in regional and local development persist, and popular dissatisfaction with EU policies, especially in less economically developed regions, is growing, which research has shown (Dijkstra, Poelman & Ridriguez-Pose, 2019) is associated with economic recession and declining employment. This raises a number of questions:

Why does this happen? Why was the smart specialization approach effective in some EU countries and regions and not in others, what affects it? What lessons can other countries, in particular Ukraine, draw from the EU experience? How can the smart specialization approach be adapted to the conditions and needs of Ukraine's post-war economic recovery based on innovation, taking into account three important circumstances?

First, the enormous losses and destruction of industrial enterprises, infrastructure, social and municipal facilities inflicted on Ukraine by the aggressor country, the urgency of restoring

them on a completely different, modern technological basis.

Second, the pre-war lag of Ukraine from European countries in industrial development, obsolescence of technology, equipment and methods of production, the need for their modernization and replacement, in particular, with modern digital technology in the context of the deployment of Industry 4.0 in the world.

Third, the structural imbalance and low technological efficiency of the national economy, its raw material export orientation and low competitiveness. It is obvious that this model of economy has no prospects. In fact, Ukraine, after what it had to endure and what its people continue to endure and endure to this day, simply cannot afford to limit itself to achieving the pre-war, too modest for its potential, level of socio-economic development.

The answers to at least some of these questions can be found in economic theory, to which this article will be devoted.

First of all, it should be noted that the concept of smart specialization combines the views of various economic schools, which is undoubtedly one of its strengths. Another question is what these views and schools are and how they can be applied to countries and regions with different levels of economic development and industrial production, rich and poor, large and small.

2 Research methodology and purpose of the article

The smart specialization approach is based on the tenets of the classical school of economics, which rejects any attempt by the state to interfere with the free market, or, more precisely, on A. Smith's theory of the division of labor and Ricardo's theory of comparative advantage.

It is based on the concept of path dependence. This means that the historical context – the formed economic structure, legal norms, rules, behavioral attitudes, cultural heritage, geographical location, natural environment are important for the potential technological restructuring of the region's economy.

Along with this, the smart specialization approach is based on the principles of the Neo-Schumpeterian school of economics, which emphasizes structural changes in the economy brought about by innovation, and the concept of the innovation ecosystem. The smart specialization approach is also based on the idea of agglomeration economy, which is embodied in the search for locally determined opportunities for economic transformation and cluster development.

This study does not aim to reveal the nuances of all these schools, but to focus on the key points of the theory of free trade, which include the theory of comparative advantage by D. Ricardo. The authors

believe that answers to the questions posed above should be sought here.

Based on this, *the purpose of the article* is to analyze the smart specialization approach through the prism of the key points of D. Ricardo's theory of comparative advantages, to reveal its limitations for industrially weak countries and, on this basis, to outline the key guidelines for the development of smart specialization strategies in Ukraine, taking into account the challenges of the post-war era.

3. Limitations of the Ricardian theory for industrially weak countries

Classical economic theory and, in particular, the theory of comparative advantage, developed by D. Ricardo in the nineteenth century. Ricardo in the nineteenth century defends free trade, arguing that any country, whether strong or less developed, can profitably specialize in those industries in which it has the greatest comparative cost advantage over other countries. Or, if it has no such advantage, it should concentrate on goods in which its trading partner has the smallest cost advantage.

This would seem to make sense were it not for one thing: Ricardian theory does not take into account the technological factor. According to Ricardian theory, a country's technological base is seen as something fixed and immutable that cannot be influenced, so it makes no sense for governments to care about these issues, but rather to focus on national comparative advantage. This logic does not work if the country seeks to master new technologies to produce more complex, expensive products that will ensure the development of the economy. Mastering new technology takes time, so technologically backward countries need a period to protect their industries from foreign competitors for the period necessary for such development. By choosing this path, the country suffers losses, because it gives up the opportunity to import foreign products of higher quality at a lower price than it produces itself. But paying such a price is still necessary to develop its own advanced technologies and form a domestic competitive industrial sector. Considering the above, it can be said that the Ricardian theory of comparative advantage will suit those countries which agree with the balance of technological and industrial forces in the world, but not those countries which seek to change it. And there is hardly a poor country today willing to accept its backwardness, the raw material nature of its economy, and its secondary position in the world.

At one time, neither the United States, nor Japan, nor France, nor any other developed country in the world did this.

The first person in history to make the case for fragile industries and the use of protectionist measures was the first U.S. Treasury Secretary

Alexander Hamilton. In 1791, in his report to Congress (National Archives, 2022), he stated that the U.S. government should support and develop the national manufacturing industry, which was still in its "infancy," protecting it from foreign competition until it was established. He suggested tariffs and subsidies as government measures to protect American industries, and stressed the need to invest in infrastructure (he especially noted the importance of roads and canals for inland navigation), encouraging people to discover and invent through prizes and all-round support.

The United States introduced this tariff in 1816 and already in the early 1830s had the highest average industrial tariff in the world, which lasted almost an entire century (!) – until the beginning of World War II. This allowed the country to create a strong manufacturing sector (Chang, 2014, p. 33–34). By comparison, France at the time was totally dependent on imports and economically weak. For example, the productivity of the French worker was three times lower than that of the American worker and 1.5 times lower than that of the English worker. One French farmer supplied five consumers with agricultural products, while an American farmer supplied fifteen. The average age of machines in French industry was 25 years, while in the United States it was 5–6 years, and in Great Britain it was 8–9 years, where machines were twice as old. It is indicative of the fact that in 1945 the most modern enterprise in France was a steel plant built in 1906 by Germans in Lorraine (Monnet, 2000, p. 284–286). The profound disorganization of the economic mechanism of the already technologically backward France, which suffered enormous damage after two world wars, the desire to prevent at all costs the outbreak of a new war prompted the country's leadership to develop the Plan de Modernisation et d'Équipement (hereinafter – the Plan), the main initiator and supervisor of preparation of which was the famous French politician, economist and diplomat Jean Monnet.

The plan was based on three pillars: first, to raise national production to a higher technological level; second, to increase production and reduce production costs to ensure its competitiveness in foreign markets; and third, to urgently reconstruct and rebuild the country, rallying the nation around the single goal of modernizing France. Any pandering to the interests of certain groups interested in preserving rather than restoring the country's productive potential, according to J. Monnet. Monnet, would stop progress and improvement of living standards and turn France into a secondary state (Monnet, 2000, p. 291). By joining forces with other countries (West Germany, Belgium, the Netherlands, Luxembourg, and Italy), France was able to achieve many of the planned structural changes.

Returning to A. Hamilton, we note that his ideas about the need to support and develop manufacturing industry and protect it from foreign competitors were developed by the German economist Friedrich List, who, incidentally, is mistakenly considered their author. At first he supported the idea of free trade between different countries, and only after he became acquainted with Hamilton's arguments, he changed his mind to the opposite.

F. List recognized that free trade benefits countries with the same level of development, but harms backward countries if they trade with economically more powerful states. Therefore, as the Norwegian economist E. Reinert notes, F. List warned weak, especially small, countries against prematurely opening their markets to foreign industrial goods. He insisted that free trade should be introduced slowly, gradually, otherwise poor countries risk becoming even more impoverished. First they need to industrialize, create a competitive industrial sector, and only after that can they benefit from access to global free trade (Reinert, 2016).

E. Reinert reminds us that all modern rich countries used the same strategy – they abandoned their raw material orientation in favor of the processing industry and necessarily survived a period when imitation, the desire and desire to match or surpass – was their main priority. He aptly notes that after 1957, when the Soviet Union launched the first satellite and it became clear that it was ahead of the United States in the space race, the former could, armed with Ricardian theory, argue that the Americans had a comparative advantage in agriculture, not in space technology. Following this logic, the United States should produce food and the Soviet Union should produce space technology. However, the U.S. chose not the Ricardian theory, but the opposite strategy of imitation, creating NASA in 1958 to catch up and overtake the Soviet Union in the field of space technology, which, in fact, they have successfully achieved (Reinert, 2016). In the question of choosing a development strategy, what could be more obvious for underdeveloped third world countries?

4 Key guidelines for the development of smart specialization strategies in post-war Ukraine

However, today's popular models of development of industrially weak countries, aimed at strengthening market forces and maximum limitation of functions of the state as an active regulator of financial and economic relations, ignore the historical experience and the obvious importance of industry for the socio-economic recovery of countries. Instead, the "Washington Consensus" doctrine is being imposed, which primitivizes economic policy and reduces it to the following simplistic guidelines: liberalization of prices and foreign trade, privati-

zation of state property and strict monetary base planning. At the same time, the main factors of public welfare and economic growth such as technological progress, reindustrialization, increased funding for science, education and public procurement, implementation of public investment programs – are simply ignored. The Washington Consensus reforms are now associated with neoliberalism and, as E. Reinert notes, almost entirely prohibit the methods by which modern rich countries became wealthy (Reinert, 2016, p. 43).

Given the above, it should be stated that in the pre-war period, Ukraine was in a difficult situation. The Deep and Comprehensive Free Trade Agreement as a component of the Association Agreement with the EU is often perceived as a source of economic growth and social well-being of the country, which is more of a simplistic emotional judgment and wishful thinking than has any connection with reality. After all, it did not take into account the rent-oriented, raw material-oriented nature of the Ukrainian economy, its weakness and vulnerability, and its inability to produce the necessary volume of competitive goods and services on European and world markets.

According to the theory of A. Hamilton and F. List's theory that by opening the domestic market to European products, Ukraine harms itself because it cannot compete on an equal footing with powerful European manufacturers. The technological and production conditions prevailing in EU member states, at least in most of them, and in Ukraine are not comparable. Developed EU member states are in the process of transition to a new, sixth technological system – Industry 4.0, while in Ukraine, production of the third and fourth technological systems dominates, and innovations are not the priorities of either industrialists or the state (Pidorycheva & Antoniuk, 2022; Omelyanenko et al., 2021). These differences must be taken into account, and miscalculations in national economic policy must be corrected as much as possible in the development of the National Plan for the Postwar Recovery of Ukraine (hereafter, the Plan), and then in the modernization of regional strategies of smart specialization. They should not drive Ukraine into a raw material corner because of our "comparative advantage" in raw material possession, but should provide opportunities for scientific and technological progress, reindustrialization of the economy based on the effective mastering of the achievements of Industry 4.0, development of fundamentally new activities that in the coming decades will form markets with the highest level of profitability, such as precision medicine and genomics, robotics and cyber defense.

According to the smart specialization approach, each country and/or region, using its strengths and identifying latent opportunities, should select as

smart priorities a number of activities or groups of activities from which they can gain sustainable competitive advantages to: create entirely new technological paths of development; and/or technologically improve existing industries; and/or diversify the economy.

It follows that the smart specialization approach is not only about radical innovations that create new markets (since not all regions succeed in this and only a few can expect to form completely new industries), but also about improving innovations that will contribute to structural changes in the economy by modernizing and/or diversifying it.

It is desirable that such activities should be related to specific technologies or a combination of them, which will extend to different areas of the economy, and in which innovative projects will complement the existing production assets. As the authors of the paper (McCann & Ortega-Argilés, 2016, p. 538) point out, the selected activities should provide the region with the most realistic chance of gaining international competitiveness through local and interregional linkages. They should be partially embedded in the region's existing production structure, so that as many local businesses as possible participate in the smart specialization strategy.

In the context of postwar research, the political, economic and legal systems of the region should be analyzed as a system of interrelated formal rules and informal constraints that should form the institutional trajectory that guides the region's economy along its unique path. As part of this approach, it is necessary to identify a system of institutional effects that can expand the choice of

strategies of economic agents and prevent them from radically changing the institutional boundaries.

This approach is suitable for an institutional-evolutionary strategy of smart specialization, the purpose of which can be defined as supporting the natural evolution of an existing institution (set of institutions) within the framework of a regional strategy. The advantage of the institutional strategy is the ample opportunities for adaptation and correction in the process of development of institutions. Figure 1 shows the scheme of institutional support of innovation policy for post-war reconstruction.

The formation of the conceptual provisions of the regional innovation policy of post-war reconstruction on the basis of smart specialization is proposed to carry out on the basis of the following principles:

1. The principle of consistency of the development strategy with all existing strategies (sectoral, territorial, resource). This principle determines the degree of consistency of stage-by-stage implementation of the general innovation strategy with the strategy of safe development.

2. The principle of interaction between the strategy of safe development and the projected changes in the external environment (technological dynamics). It should be based on the compliance of the subsystem development strategy with the projected changes in indicators (national and within the framework of international measurements) to minimize threats and realize the potential of the external environment.

3. The principle of interaction between the strategy of sustainable and safe development of the state and its innovative capabilities. This principle

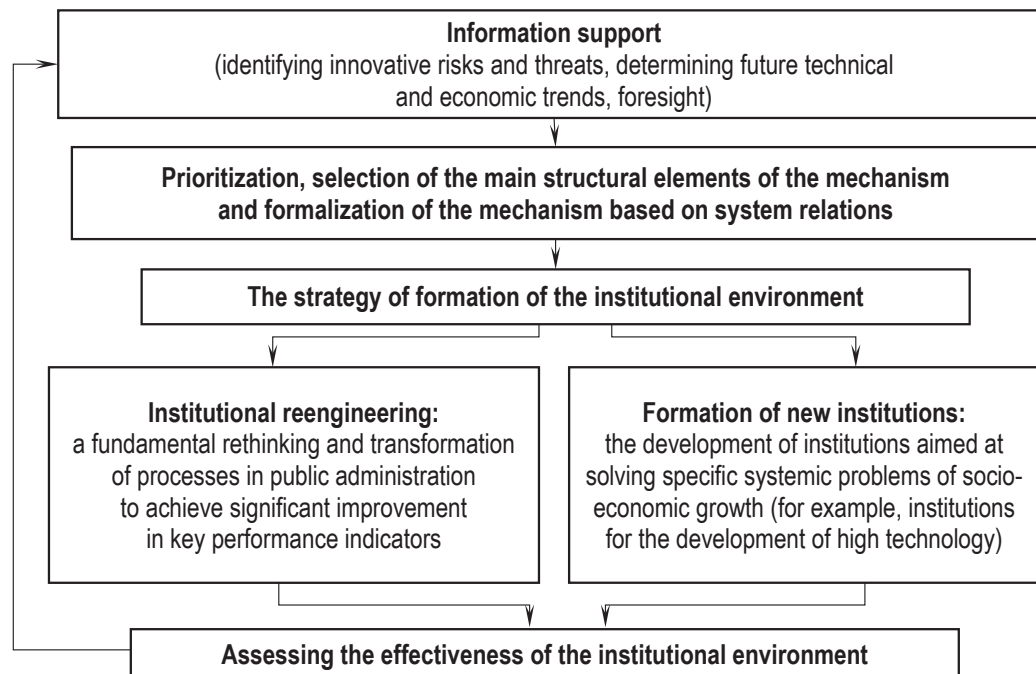


FIGURE 1 Institutional and innovative provision of regional development policy

determines the potential of formation of resources of innovative development and compliance of development strategies with resources.

4. The principle of reality of the development strategy determines the strategic opportunities in the implementation of complex innovation and investment projects in a certain perspective, in the formation of the necessary amount of resources.

5. The principle of determining the acceptable level of risk (strategic development risk corridor) associated with the implementation of selected development strategies (set of strategies). Based on this principle, the admissibility of the level of risk for activities is determined in terms of the possible size of losses and the generation of threats to strategic security (Ponomarenko et al., 2019; Omelyanenko, 2015).

6. The principle of economic and social effectiveness of the implementation of the development strategy. Reveals compliance with the target strategic objectives, image, the level of management of the functional institutions.

7. The principle of systemic solutions in the field of innovation encompasses activities that combine the interrelated provision of political, economic and military leadership, as well as diplomacy and other political-legal aspects.

8. The principle of technological interconnections. Breakthrough innovations can not only significantly change the technical and technological foundations of the industry, but also the markets, the composition and roles of actors, as well as the foundations of the economy.

9. The principle of national (local) orientation of innovative development. For development it is necessary to choose such technological areas, which will be connected with the existing potential, problems of welfare of the population, building a solid foundation for new technologies and directions of development, significant for a particular country (region).

10. The principle of strategic orientation, which provides for the inclusion of an innovative component in development programs and strategies. Strategic priorities determine the long-term development benchmarks of subjects of innovative activity, as well as the benchmarks of financing of the sector of fundamental and applied science and support of innovative communications.

5 Conclusions

1. Despite the fact that the concept of smart specialization quickly gained popularity, spreading across the EU and far beyond, the theoretical development of its main provisions is insufficient, which is reflected in practice. After seven years of implementing smart specialization strategies as part of the 2014–2020 cohesion policy in the EU

Europe 2020 strategy, there is reason to say that not all EU regions have succeeded in implementing them successfully. Inequalities in regional and local development persist, and public discontent with EU policies is growing, especially in less economically developed countries and regions. The reasons for this lie, in particular, in the limitations of Ricardian theory, on the provisions of which the approach of smart specialization is based. One of these limitations is ignoring the technological factor. D. Ricardo's theory of comparative advantage views a country's technological base as a constant, and therefore national governments should not care about their development but focus on the country's comparative advantage. This logic cannot suit countries that seek to change the commodity-based nature of their economies to an innovative and industrialized one. Mastering new technologies and introducing them into production takes time and, accordingly, protecting the industry from foreign competitors. In such a case, the country, although it bears short-term losses, does so consciously, forming a competitive industrial sector for the long term.

2. For the first time in history, the idea of the need to support and develop manufacturing industries and protect them from foreign competitors was put forward by the first U.S. Treasury Secretary A. Hamilton at the end of the 18th century. For this purpose he suggested using tariffs and subsidies, making investments in infrastructure and encouraging inventive activity of the population. A. Hamilton's ideas were developed by F. List. In particular, he proved that free trade benefits countries with the same level of development, but harms backward countries if they trade with economically more powerful states. Therefore, such countries should practice free trade very carefully, move to it gradually and only after they have formed a competitive industrial complex. All economically strong countries have developed in this way; they have abandoned their raw material orientation in favor of the processing industry and applied a strategy of imitation, the essence of which is to try to match or surpass their competitors. This model of development, however, does not apply to poor countries; instead, it offers them the "Washington Consensus" doctrine, which operates with simplified mechanisms of influence—such as price and foreign trade liberalization, privatization of state property, strict monetary planning—but misses the main factors on which the country's economic growth prospects and the well-being of its people depend: the development of science, education, processing industry, combined with each other, supported by the state, and the development of the economy.

3. Ukraine needs to take these important conclusions into account in its national economic

policy and, above all, in the development of the National Plan for Postwar Recovery and Modernization of Regional Strategies of Smart Specialization. The post-war reconstruction of Ukraine should be aimed at a radical change in the structure of the economy, the transition from the agrarian and raw material type to an industrial-innovative type based on the creation of modern high-tech, digitalized industry in the context of the deployment of Industry 4.0 in the world.

This study does not aim to reveal the nuances of all these schools, but to focus on the key points of

the theory of free trade, which include the theory of comparative advantage by D. Ricardo. The authors believe that answers to the questions posed above should be sought here.

With this in mind, the purpose of this article is to analyze the approach of smart specialization through the prism of the key provisions of D. Ricardo's theory of comparative advantage, to identify its limitations for industrial weak countries and, on this basis, to outline the main guidelines for the development of smart specialization strategies in Ukraine in view of the challenges of the postwar era.

References

- [1] European Commission (2017). Smart Regions. Smart Specialization. E-source: https://ec.europa.eu/regional_policy/sources/docgener/guides/smart_spec/strength_innov_regions_en.pdf
- [2] Foray, D., David, P. A., & Hall, B. H. (2011). Smart specialisation: from academic idea to political instrument, the surprising career of a concept and the difficulties involved in its implementation. MTEI-Working_Paper-2011-001. Lausanne: Ecole polytechnique federale de Lausanne.
- [3] Commission of the European Communities (1996). The First Action Plan for Innovation in Europe. Innovation for growth and employment. Luxembourg: Office for Official Publications of the European Communities, 20.11.1996 COM (96) 589 final.
- [4] Foray, D., Goddard, J., Goenaga Beldarrain, X., Landabaso, M., McCann, P., Morgan, K., Nauwelaers, C., & Ortega-Argilés, R. (2012). *Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3)*. Luxembourg: Publications Office of the European Union.
- [5] Benner, M. (2019). Smart specialisation and institutional context: what does it mean for path development? Papers in Economic Geography and Innovation Studies. Vienna University. E-source: http://www-sre.wu.ac.at/sre-disc/geo-disc-2019_05.pdf
- [6] Dijkstra, L., Poelman, H., & Ridriguez-Pose, A. (2019). The geography of EU discontent. *Regional Studies*, 54(6), 737–753. DOI: <https://doi.org/10.1080/00343404.2019.1654603>
- [7] National Archives (2022). Alexander Hamilton's Final Version of the Report on the Subject of Manufactures [5 December 1791]. Founders Online. E-source: <https://founders.archives.gov/documents/Hamilton/01-10-02-0001-0007>
- [8] Chang, Ha-Joon (2014). *Economics: The User's Guide*. London: Penguin books.
- [9] Monne, Zh. (2000). Real'nost' i politika. Memuary [Reality and politics. Memoirs]. Moskva: Moskovskaya shkola politicheskikh issledovanij. (in Russian)
- [10] Reinert, E. S. (2016). Kak bogatye strany stali bogatymi, i pochemu bednye strany ostayutsya bednymi [How Rich Countries got Rich and Why Poor Countries Stay Poor]. Moskva: Izd. dom Vysshej shkoly ekonomiki. (in Russian).
- [11] Pidorycheva, I. Yu., & Antoniuk, V. P. (2022). Modern Development Trends and Prospects for Innovation in the Technology-Intensive Sectors of Ukraine's Industry. *Sci. innov*, 18, 1, 3–19. DOI: <https://doi.org/10.15407/scine18.01.003>.
- [12] Omelyanenko, V., Braslavskaya, O., Biloshkurska, N., Biloshkursky, M., Kliasen, N., & Omelyanenko, O. (2021). C-Engineering Based Industry 4.0 Innovation Networks Sustainable Development. *IJCSNS International Journal of Computer Science and Network Security*, 21, 9, 267–274. DOI: <https://doi.org/10.22937/IJCSNS.2021.21.9.35>
- [13] McCann, P., & Ortega-Argilés, R. (2016). Smart specialization, entrepreneurship and SMEs: issues and challenges for a results-oriented EU regional policy. *Small Business Economics*, 46, 537–552. DOI: <https://doi.org/10.1007/s11187-016-9707-z>
- [14] Ponomarenko, T. V., Prokopenko, O. V., Slatvinskyi, M. A., Biloshkurska N. V., & Omelyanenko, V. A. (2019). National investment and innovation security assessment methodology. *International Journal of Mechanical Engineering and Technology*, 10(2), 847–857.
- [15] Omelyanenko, V. (2015). Analysis of strategycal aspects of technology transfer in metallurgy. *Metallurgical and Mining Industry*, 12, 394–397.
- [16] Territory of innovations: best practices for sustainable development at the local level (2022). Part 1: digest of analytical stage of international scientific and educational project. Collective Monograph. Sc. ed. V. Omelianenko, O. Prokopenko, T. Tirto. Tallinn: Teadmus.

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