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An assessment of innovation in economic sectors of the Pridneprovsky Economic Region in Ukraine

Abstract. *The article provides a comparative assessment of the innovativeness of Ukrainian and Polish manufacturing. The main types and kinds of innovation in different sectors of the Pridneprovsky Economic Region are identified and each kind of economic activity in the region is rated in terms of intensity and efficiency of development. It was found out that the most promising sector of the Pridneprovsky Economic Region was the engineering industry, where innovation is based on engineering developments and research. The authors provide economic justification for measures to increase intensity and efficiency, and hence the level of innovation of key economic activities of the region. What is required is an innovation-oriented ecosystem that provides conditions for research and development, the formation and development of networks that consolidate activities of research centers and science-intensive industrial production, training of professional staff; reliable protection of intellectual property, the development of industrial clusters; that facilitate access to global sources of technology, knowledge and highly qualified engineering and technical personnel.*

Keywords: *innovative activity, industry, innovations, types of economic activit*

1. Formulation of the problem

An innovative ecosystem creation is a complex activity that provides the prerequisites for sustainable development and competitiveness of the territory. On the one hand, innovative ecosystems are formed under the influence and taking into account global social, technological, economic and environmental changes. On the other hand, they are created and developed in a limited (localized) space, where material, production, information and labor resources are already concentrated, which makes it possible to develop and use innovative solutions.

The concept of an innovative ecosystem offers a tool for creating conditions that increase the competitiveness of individual enterprises in various economic sectors. At the center of the concept is the idea that innovation is the process of transforming an idea into the final innovative product or service, the implementation of which requires many participants: entrepreneurs, universities, research institutions, venture funds and others. The combination of all participants allows the innovative ecosystem to implement the full cycle of innovation development.

Each economic sector has the peculiarities of conducting economic activity and types of innovative activity. Some focus on innovative processes based on research centers or companies, others believe that the speed of the implementation and dissemination of innovations is the most important thing. Each activity creates a demand for the relevant institutions of the innovative ecosystem and is a source of demand for the results of innovation. For example, the high-tech business allows universities to form a wide network of partnerships to solve problems: the focus of applied research on the interests of specific customers, obtaining additional sources of funding from customers – high-tech companies of the region, employment of university graduates in high-tech industries. Therefore, the formation of an innovative ecosystem is impossible regardless of the needs and capabilities of participants in the innovative process (Pidorycheva, 2020).

The purpose of the article is to determine which economic sectors have been more successfully developed in recent years in the Pridneprovsky Economic Region (PER), what kinds of innovative activity and types of innovation are peculiar to them, as well as to draw conclusions about the conditions to be provided by the innovative ecosystem of PER to enhance the development of such activities.

In the process of research, the methods of analysis and synthesis, logical generalization, system approach, special methods in economics – economic and statistical analysis, grouping, comparisons and observations were used. To obtain the results, we used the primary data of the State Statistics Service of Ukraine, main departments of statistics of the Dnipropetrovsk, Zaporizhia and Kirovohrad regions from 2012 to 2018, which characterize the innovative activity of industrial enterprises, enterprises by types of innovation and economic activity, intensity

and industry efficiency of development of economic sectors and industry of PER, as well as own data which were received in the course of the economic and statistical analysis, grouping and comparisons.

2. Literature review

The modern general definition of innovations extends innovative activity to all economic sectors, and the very definition of "innovation" is one that can be applied to each sector. Innovations are new or improved products or processes (or their combinations) that are significantly different from the products previously produced by the unit or business processes used by it, offered to potential users (products) or used by the unit (processes) (OECD. Eurostat. 2018).

According to this definition, there are technological (product and process) and non-technological (marketing and organizational) types of innovation.

Technological innovation is the introduction of technologically new and significantly technologically improved products (product innovations) and processes (process innovations). *Product innovation* is the introduction of a product or service that is new or significantly improved in terms of its properties or utilization. Product innovation includes significant improvements in specifications, components and materials, embedded software, user compatibility, or other functionalities; *process innovation* is the introduction of a new or significantly improved method of production or delivery of the product. It includes significant changes in technology, production equipment and/or software.

Marketing innovation is the introduction of a new method of marketing, which includes significant changes in the design or packaging of the product, its warehousing, market promotion or sales pricing.

Organizational innovation is the introduction of a new method and form of organization of all activities of enterprises, improvement of the organizational structure of the management and controllable subsystem of enterprises, improvement of the organization of labor and organization of use of all types of resources in enterprises (Science and innovation in Ukraine, 2018, p. 11).

Traditionally, the analysis and modeling in the economics of innovation focus on identifying technological changes, usually measured by indicators of research and development or patenting (Archibugi & Planta, 1996). However, recently, no less significant are management and organizational innovations, emphasizing the importance of organizational and marketing changes, along with product and process innovations (Franz & Lambert, 2008, p. 18).

Many studies are devoted to the practice of using different types of innovations. Thus, British scientists, using cluster and factor analysis, have identified

two types of innovation, namely "expanding innovation", which combines marketing, organizational, managerial and strategic innovations, and "traditional innovation" which includes product, process and technological innovations. The authors associate these regimes with manufacturing companies and conclude that "expanding" and "direct" innovations do not replace, but rather complement each other. Enterprises that practice both types of activities show higher productivity (Battisti & Stoneman, 2007).

The importance of technological innovation for the economy is determined by the fact that technology ultimately generates wealth, which is a key point for political and economic power; technology is a major factor in increasing productivity and competitiveness; technology is a means of uniting the interests of science, business and government; technology requires a new philosophy of management and practice.

Technological innovations are the basis for the implementation of vital strategies for future technological growth, they increase the productivity of the economy. Economic achievements depend on how quickly technology potentials are recognized and exploited. Therefore, scientific and technical results must be promptly developed and transmitted for use, business must be managed, and government regulation must be aimed at the timely and effective use of technological innovations (Peshkun 2010, pp. 140-141).

3. Main results of the study

The innovativeness of the Ukrainian economy is quite low. In particular, the share of innovative products in the volume of sold industrial products (a key indicator of innovation efficiency) in Ukraine in 2019 was 1.3% against 0.8% in 2018 and 3.3% in 2013. At the same time, the same indicator was over 9% in Poland and over 19% in Germany. In the context of process manufacturing in Ukraine and Poland, the highest share of innovative products is manufactured by mechanical engineering (Table 1). The least innovative products in the Ukrainian industry are products of low-tech industries, including food, consumer goods, woodworking, furniture, other products, repair and installation of machines and equipment. In Poland, the products of the same industries are also less innovative, but their level significantly exceeds the same indicators of Ukraine. It should be noted that the raw material, resource potential in the production of low-tech industries in Ukraine is approximately the same in Poland (Sozanskyy & Ryvak, 2020).

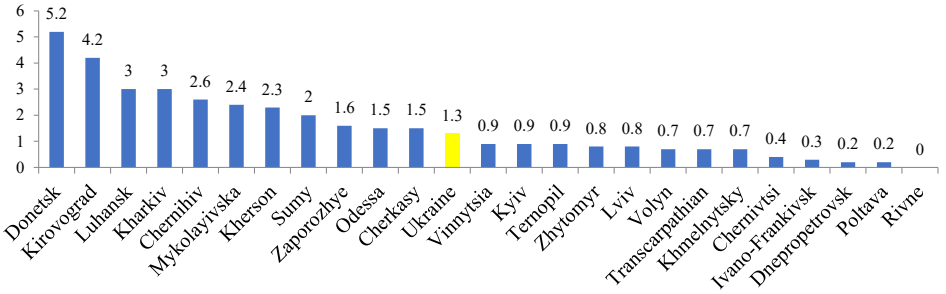
Thus, the low innovation of industrial products, which has the highest potential for innovation, development and implementation of technological innovations

Table 1. The share of innovative products in the volume of sold products (goods, services) by industrial enterprises, Ukraine and Poland (%)

Production	Code NACE Rev. 2	Ukraine	Poland
Industry	B+C+D+E	1.3	9.3
Mining and quarrying	B	**0.2**	0.4
Manufacturing	C	**1.9**	10.9
Manufacture of food products	10	0.9	3.7
Manufacture of beverages	11	2.3	7.3
Manufacture of tobacco products	12	…	7.9
Manufacture of textiles	13	0.4	13.1
Manufacture of wearing apparel	14	0.2	3.2
Manufacture of leather and related products	15	…	3.2
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	16	0.1	6.7
Manufacture of paper and paper products	17	0.1	14.7
Printing and reproduction of recorded media	18	6.3	6.3
Manufacture of coke and refined petroleum products	19	…	16.1
Manufacture of chemicals and chemical products	20	0.6	8.1
Manufacture of basic pharmaceutical products and pharmaceutical preparations	21	1.7	9.6
Manufacture of rubber and plastic products	22	1.8	6.5
Manufacture of other non-metallic mineral products	23	0.7	4.4
Manufacture of basic metals	24	3.2	5.1
Manufacture of fabricated metal products, except machinery and equipment	25	0.7	7.0
Manufacture of computer, electronic and optical products	26	6.3	23.2
Manufacture of electrical equipment	27	4.1	27.2
Manufacture of machinery and equipment n.e.c.	28	8.1	15.2
Manufacture of motor vehicles, trailers and semi-trailers	29	5.6	21.8
Manufacture of other transport equipment	30	1.6	21.7
Manufacture of furniture	31	1	5.9
Other manufacturing	32	0.3	4.1
Repair and installation of machinery and equipment	33	0.4	6.9
Electricity, gas, steam and air conditioning supply	D	…	0.5
Water supply; sewerage, waste management and remediation activities	E	…	1.5

Source: calculated according to SSSU (2021), Eurostat (2021).

Chart 1. The share of innovative products in the volume of sold products (goods, services) by industrial enterprises of the regions of Ukraine in 2019 (%)



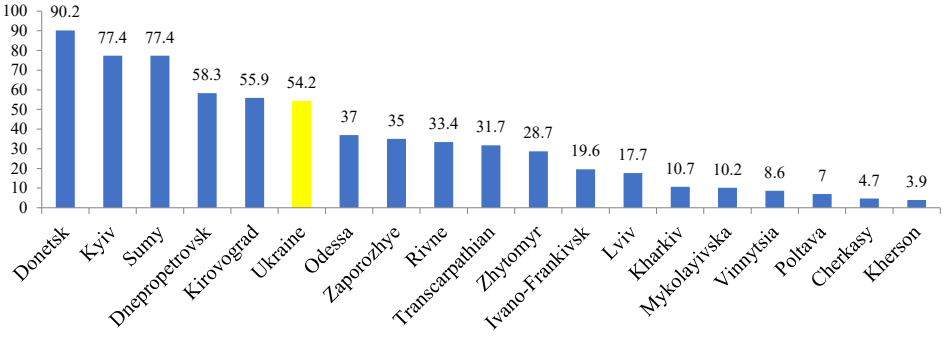
Source: calculated according to SSSU (2021), Eurostat (2021).

is a confirmation of the low level of innovation of the Ukrainian economy as a whole.

Among the regions of Ukraine, the highest level of product innovation is in the Donetsk, Kirovohrad, Luhansk and Kharkiv regions (Chart 1). Here the share of innovative products in the volume of sold products (goods, services) is more than twice as high as in Ukraine. The lowest value of this indicator in the range of 0.0-0.4% in 2019 was recorded in the Chernivtsi, Ivano-Frankivsk, Dnipropetrovsk, Poltava and Rivne regions.

In addition to the low level of innovation of Ukrainian industry products, the problem is the excessively high export orientation of innovative products. Thus, the share of sold innovative products outside the country in the volume of sold innovative products exceeds 54% (Chart 2). This situation in conditions of

Chart 2. The share of sold innovative industrial products (goods, services) outside Ukraine in the volume of sold innovative products of certain* regions of Ukraine (%)



* For some regions of Ukraine such information is not available.

Source: calculated according to SSSU (2021), Eurostat (2021).

economic instability will create potential risks for stable innovative development of the country. Moreover, the fact that most innovative products are not sold in the domestic market is a sign of systemic problems related to the macroeconomic factors, system of stimulating and regulating innovation in Ukraine, as well as the imbalance of intersectoral ties in the economy. It is noteworthy that the Donetsk region is the leader in Ukraine in terms of the share of innovative products (4%), as well as the leader in terms of export-oriented innovative products, more than 90% of which are sold outside the country. High export orientation is also peculiar to the Kirovohrad region – the second product innovation in the country.

Relatively small volumes of production of innovative products and their high export orientation are one of the main and most important barriers to achieve a higher level of social and economic level of functioning and development of the country and its regions. First of all, this is due to the fact that a low-innovation economy provides lower economic, financial and social efficiency, expressed in such indicators as average monthly wages, gross value added per employee, gross domestic product growth, labor productivity and others. In particular, product innovation affects the level of wages, productivity, dynamics of gross value added, profit growth and decrease in production cost. As a result, low innovation of economic products indirectly generates labor migration from the country, dependence on international financial funds, and thus the gradual loss of the country's own innovative potential. Under these circumstances, as well as under the economic influence of challenges caused by global economic instability, the country's economy may be threatened by a loss of competitiveness and productive potential. In sum, all this may lead to such negative trends as even greater growth in the structure of output and exports of low-tech products and goods produced by tolling operations, reducing the role of the economy in international value chains, increasing dependence on imports of intermediate and final goods and fixed capital. Consequently, economic threats can cause serious social and financial challenges.

One of the important reasons for the low level of innovation of Ukrainian products is the low innovative activity and the share of technological innovations that can create the highest multiplier effect in the economic and social spheres.

In Ukraine, most industries, even if they are aimed at technological innovations, prefer their process component (Table 2). This refers, for example, to the construction industry, although global construction companies create the very product innovations (investments).

Each economic sector has the peculiarities of conducting the economic activity and its own types of innovative activity. The work (*Innovatsii v Rossii – neischerpayemyy istochnik rosta*. 2018) proposed a methodology according to which sectors were divided into four types by dominant sources of innovation: scientific, engineering, consumer and type of efficiency. Sectors of one type

Table 2. The ratio of the share of innovatively active enterprises of Ukraine in the total number of enterprises by type of innovations and economic activity (%)

Type of economic activity	Innovatively active enterprises	Of them				
		enterprises with technological (product and / or process) innovations	of them:			enterprises only with non-technological (marketing and/or organizational) innovations
			enterprises with technological (product and / or process) innovations	enterprises with process innovations	enterprises with product and process innovations	
Total	1.00	1.00	1.00	1.00	1.00	1.00
Industry	1.05	1.43	1.51	1.33	1.33	0.84
Mining and quarrying	0.78	0.75	0.31	1.09	1.09	0.80
Manufacturing	1.13	1.56	1.75	1.26	1.26	0.90
Electricity, gas, steam and air conditioning supply	0.71	0.89	0.37	2.00	2.00	0.61
Water supply; sewerage, waste management and remediation activities	0.56	0.81	0.42	1.71	1.71	0.42
Trade	1.07	0.46	0.42	0.57	0.57	1.42
Transportation and storage	0.55	0.39	0.21	0.67	0.67	0.65
Information and communication	1.12	0.99	1.01	0.90	0.90	1.20
Financial and insurance activities	1.36	1.15	0.53	1.79	1.79	1.49
Architectural and engineering activities; technical testing and analysis	0.78	0.75	0.89	0.49	0.49	0.80
Scientific research and development	1.33	2.83	2.62	1.75	1.75	0.49
Advertising and market research	1.21	0.79	0.84	0.81	0.81	1.45

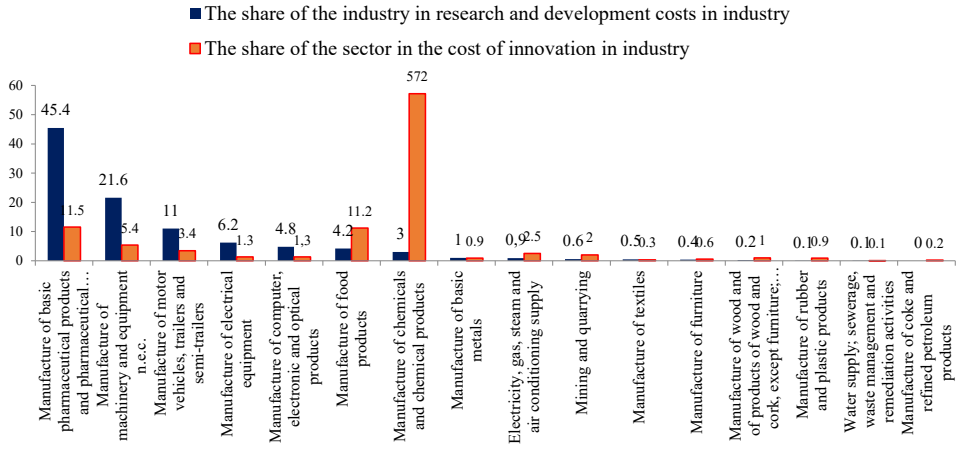
The activities in which the share of enterprises with technological and product innovations is the largest are highlighted in grey.

Source: calculated according to SSSU (2021).

have the general specificity, which makes it possible to determine the patterns of emergence and development of innovations.

Chart 3 demonstrates how metallurgical production (57%), production of pharmaceutical (12%) and food (11%) products are in the lead in terms of total

Chart. 3. Distribution of total volume of expenditures on innovative activities by types of economic activity of Ukrainian industry (%)



Source: calculated and compiled according to SSSU (2021).

expenditures on innovation among the types of economic activity of industry. However, pharmaceutical enterprise (45%) and mechanical engineering spend the most on research and development: machinery and equipment (22%), motor vehicles (11%), electrical equipment (6%) and computers (5%). These sectors will be considered as sectors where innovation is determined by research.

The classification of sectors in strict accordance with the types of innovations is not indisputable since each of the sectors has different types and kinds of innovations.

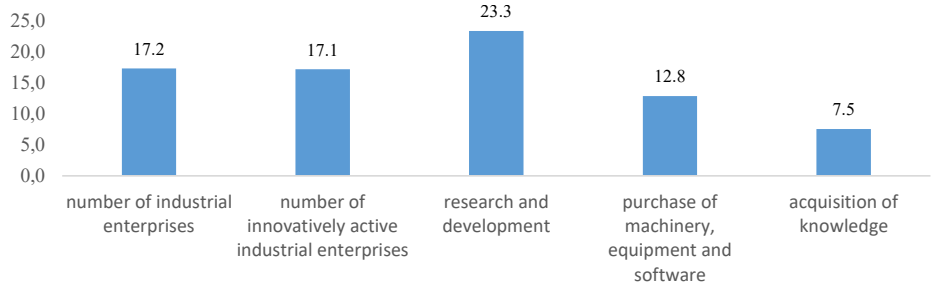
3.1. Innovative development of economic sectors of the Pridneprovsky economic region

The level of innovative development of the Pridneprovsky economic region is primarily determined by the level of development of the industrial potential of the Dnipropetrovsk, Zaporizhia and Kirovohrad regions, which are part of it. Dnipropetrovsk and Zaporizhia regions are industrially developed and together generate 26% of sold industrial products in Ukraine. The contribution of the Kirovohrad region is much smaller – 1.3%.

Almost every sixth industrial enterprise and every sixth innovative industrial enterprise of Ukraine is located in the Pridneprovsky economic region (Chart 4).

Analysis of the situation among industrial enterprises of the Prydniprovsky economic region makes it possible to draw the following conclusions: the share

Chart 4. The place of the Pridneprovsky economic region among the industrial enterprises of Ukraine by the areas of innovative activities



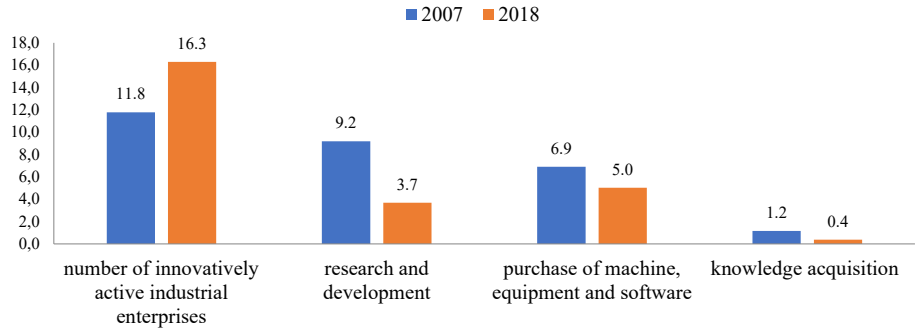
Source: compiled according to SSSU (2021).

of innovative enterprises has increased over the past 10 years, although the absolute number of those who carried out research and development has decreased significantly. The share of research potential of industrial enterprises of the Prydniprovsky economic region has significantly decreased. Most of them began to prefer the purchase of machines, equipment and software, rather than research and development (Chart 5.).

The general characteristic of innovative development of PER related to industrial enterprises is given. Assessment of the level of innovative activity of economic sectors should take into account the specifics, namely, the kind and type of innovation that are peculiar to each of them.

According to Table 3, the enterprises with non-technological (marketing and/or organizational) innovations prevail in PER. Meanwhile, the percentage of

Chart 5. Distribution of industrial enterprises of the Prydniprovsky economic region by the areas of innovative activities (%)



Source: compiled by the author according to the SSSU (2021).

Table 3. Distribution of innovatively active PER enterprises by technological and non-technological innovations (%)

Region	Enterprises with technological (product and/or process) innovations	These include			Enterprises only with non-technological innovations
		enterprises with product innovations	enterprises with process innovations	enterprises with product and process innovations	
Ukraine	**35.9**	9.4	12.7	13.9	**64.1**
Dnipropetrovsk region	34.8	9.3	13.0	12.5	65.2
Zaporizhia region	35.5	13.9	4.3	17.3	64.5
Kirovohrad region	53.0	15.2	20.7	17.1	47.0
On average in PER	**41.1**	**12.8**	**12.7**	**15.6**	**58.9**

Source: calculated and compiled according to SSSU (2021).

enterprises with technological innovations is higher than the average in Ukraine (41.1% and 35.9%, respectively), in particular, it relates to enterprises with product innovations (12.8% and 9.4%, respectively).

To determine the type of innovations that are most peculiar to PER economic sectors, it is advisable to determine the rating of their development by intensity (growth rate of production) and efficiency (contribution to GRP). The methodology of integrated measurement of the development of PER economic activities is based on a score by the indicators of intensity and effectiveness and their total value. Each of the indicators is extremely important, so the weight effect of each is taken at the level of 50% ($0.5 \times 2 = 1$). The results of the score are shown in Table 4.

The rating of types of economic activity of PER by development intensity and efficiency based on score assessment presented in Chart 6.

Metallurgical production, mining industry, chemical industry, production of rubber and plastic products, as well as production of coke and oil refining products are developing more intensively and effectively in PER. It is not possible to provide a realistic assessment of the development of the pharmaceutical industry in PER since domestic statistics do not provide data on the production indexes of the pharmaceutical industry in the Dnipropetrovsk and Zaporizhia regions. Therefore, the score was based only on the data of the production index in the Kirovohrad region, as well as the volume of sold pharmaceutical products of all regions that are part of PER.

Consideration of the methodology according to which sectors are divided into four types by dominant sources of innovation: scientific, engineering, consumer and type of efficiency, as well as compiling and analyzing the rank-

Table 4. Score assessment of the development of PER sectors by development intensity and efficiency in 2012-2018

Type of economic activity	Development intensity			Development efficiency			Total score
	index of physical production volume	score		specific weight in total production volume	score		
		total	balanced		total	balanced	
Overall in PER	**102.2**	**1**	×	**17.3**	**1**	×	×
Agriculture, forestry and fishing	129.7	1.269	0.635	13.5	0.780	0.390	1.025
Mining and quarrying	99.3	0.972	0.486	36.5	2.110	1.055	1.541
Manufacturing	94.1	0.921	0.460	27.1	1.566	0.783	1.244
Manufacture of food products; beverages and tobacco products	98.7	0.966	0.483	12.0	0.695	0.347	0.830
Manufacture of textiles, wearing apparel, leather and related products	97.0	0.949	0.474	10.6	0.612	0.306	0.780
Manufacture of wood, paper, printing and reproduction	99.0	0.969	0.484	7.2	0.414	0.207	0.691
Manufacture of coke and refined petroleum products	97.1	0.950	0.475	19.1	1.106	0.553	1.028
Manufacture of chemicals and chemical products	96.2	0.942	0.471	26.1	1.509	0.755	1.225
Manufacture of basic pharmaceutical products and pharmaceutical preparations*	50.5	0.494	0.247	1.1	0.065	0.033	0.280
Manufacture of rubber and plastic products	106.9	1.046	0.523	20.2	1.168	0.584	1.107
Manufacture of basic metals	100.0	0.978	0.489	53.0	3.062	1.531	2.020
Mechanical engineering	80.3	0.785	…	21.7	1.255	0.627	0.627
Electricity, gas, steam and air conditioning supply	86.7	0.848	0.424	19.0	1.098	0.549	0.973
Construction	110.3	1.079	0.540	9.6	0.555	0.277	0.817
Trade	86.2	0.843	0.422	10.0	0.578	0.289	0.711
Transportation and storage	102.9	1.007	0.503	10.2	0.590	0.295	0.798
Hotel and restaurant business	108.2	1.059	0.529	11.1	0.642	0.321	0.850
Information and communication	140.2	1.372	0.686	6.8	0.393	0.197	0.882

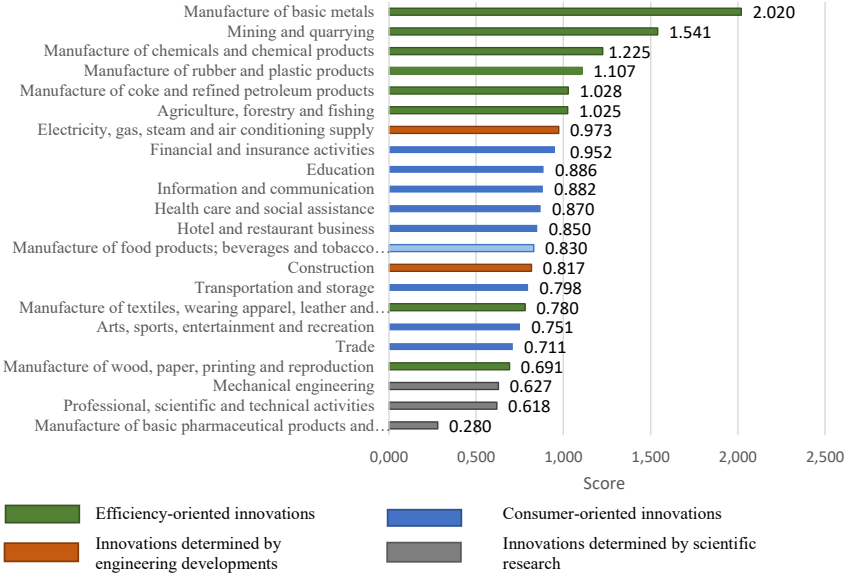
Table 4 – cont.

Type of economic activity	Development intensity			Development efficiency			Total score
	index of physical production volume	score		specific weight in total production volume	score		
		total	balanced		total	balanced	
Financial and insurance activities	118.9	1.163	0.582	12.8	0.740	0.370	0.952
Real estate activities	142.0	1.389	0.695	13.4	0.775	0.387	1.082
Professional, scientific and technical activities	88.6	0.867	0.433	6.4	0.370	0.185	0.618
Administrative and support service activities	111.4	1.090	0.545	10.3	0.595	0.298	0.843
Education	96.7	0.946	0.473	14.3	0.827	0.413	0.886
Health care and social assistance	96.8	0.947	0.474	13.7	0.792	0.396	0.870
Arts, sports, entertainment and recreation	99.1	0.970	0.485	9.2	0.532	0.266	0.751

* There are no data on production indexes of the pharmaceutical industry in the Dnipropetrovsk and Zaporizhia regions.

Source: calculated according to SSSU (2021).

Chart 6. Rating of types of PER economic activities by development intensity and efficiency in 2012-2018



Source: compiled by the author based on research results.

Table 5. Economic sectors of the Prydniprovsky economic region by types and kinds of innovations*

Types of economic and industrial activities	Rating	Types of innovations	The predominant type of innovation	Technological level of industries
Manufacture of basic metals	1	Innovation focused on efficiency	Product and process	Medium low
Mining and quarrying	2	Innovation focused on efficiency	Process	Medium low
Manufacture of chemicals and chemical products	3	Innovation focused on efficiency	Product and process	Medium low
Manufacture of rubber and plastic products	4	Innovation focused on efficiency	Product and process	Medium low
Manufacture of coke and refined petroleum products	5	Innovation focused on efficiency	Product and process	Medium low
Agriculture, forestry and fishing	6	Innovation focused on efficiency	Product and process	_
Electricity, gas, steam and air conditioning supply	7	Innovations determined by engineering developments	Product and process	_
Financial and insurance activities	8	Consumer-oriented innovations	Non-technological	_
Education	9	Consumer-oriented innovations	Non-technological	_
Information and communication	10	Consumer-oriented innovations	Non-technological	_
Health care and social assistance	11	Consumer-oriented innovations	Non-technological	_
Hotel and restaurant business	12	Consumer-oriented innovations	Non-technological	_
Manufacture of food products; beverages and tobacco products	13	Consumer-oriented innovations	Product and process	Low
Construction	14	Innovations determined by engineering developments	Process	_
Transportation and storage	15	Consumer-oriented innovations	Non-technological	_
Manufacture of textiles, wearing apparel, leather and related products	16	Innovation focused on efficiency	Product and process	Low
Arts, sports, entertainment and recreation	17	Innovation, oriented for consumers	Non-technological	_
Trade	18	Innovation, oriented for consumers	Non-technological	_
Manufacture of wood, paper, printing and reproduction	19	Innovation focused on efficiency	Product and process	Low

Table 5 – cont.

Types of economic and industrial activities	Rating	Types of innovations	The predominant type of innovation	Technological level of industries
Mechanical engineering	20	Innovations that are determined by scientific research	Product and process	High
				Medium high
Professional, scientific and technical activities	21	Innovations that are determined by scientific research	Product innovations	–
Manufacture of basic pharmaceutical products and pharmaceutical preparations	22		Product and process	High

* The colors in the Table 5 correspond to the colors in Figure 6.

Source: compiled by the author based on research results.

ing of economic activities by development intensity and efficiency makes it possible to make such observations. According to the types of innovations in PER, efficiency-oriented sectors are developing more intensively and effectively. Enterprises of these activities implement technological innovations (process and product), the technological level of sectors is medium-low. Types of activities that focus on scientific innovations with their product type – mechanical engineering, professional research and technical activities, pharmaceuticals – are at the end of the ranking of PER sectors by development intensity and effectiveness Table 5.

4. Conclusion

Institutional support for the formation of the innovative ecosystem depends on what kind and type of innovations the leading types of economic activity developed in a limited geographical area and implement local innovative processes aim at.

If PER continues to develop economic activities in which innovation is focused on efficiency (primarily the metallurgical industry), for which the most important is the presence of a developed system of partnerships that promotes effective interaction of suppliers, producers and customers, and the costs of innovation are spent on the purchase of new technologies, machines and equipment, the implementation of new innovative solutions should be carried out in the following directions:

– modernization of equipment with the mandatory introduction of new ecological systems and improvement of production processes aimed at increasing the range of products (Yakubovskiy, & Soldak, 2017a, b, p. 46);

– implementation of digital technologies at all stages of production: IoT-platforms, cloud technologies, intelligent sensors, mobile devices, "smart" machines and mechanisms, additive technologies (3D-printing), which provide advanced interfaces for human-machine interaction, multilevel interaction with customers and collection of customer information, verification and fraud detection (Amosha, & Nikiforova, 2019).

For the development of such industries, the local innovative ecosystem should provide training for STEM staff who have and regularly update modern digital skills through various programs aimed at promoting lifelong learning in a region, establishing partnerships with business in the formation of STEM staff development, reforming the education system and methods of staff training, as well as regulating investment in lifelong learning through the introduction of tax benefits and preferences (Chekina & Vorhach, 2019, p. 52).

Among the activities whose innovative activity is determined by engineering developments and research in PER, the most promising is the engineering industry. To increase production volume through the creation and implementation of new and improved technologies, it is necessary to conduct research and development where manufacturers work closely with scientific institutions, university faculties, research centers. There is a need for professional staff and a business environment that provides reliable protection of intellectual property; the presence of developed industrial clusters, as well as policies that promote greater access to global sources of technology, knowledge and highly qualified engineering and technical personnel.

The long-term efforts required by scientific innovation necessarily involve a favorable environment at the national level. One of the first steps in this direction may be making appropriate adjustments to the Strategy of Innovative Development of Ukraine to create high-level groups for key technologies; identification and periodic updating of the national list of key technologies; level increase in R&D funding to at least 2% of GDP; stimulation of long-term investment in R&D; adjusting the share of private funding in total funding to 50% (Vyshnevskyi et al., 2018, p. 121), strict measures to protect intellectual property, ensuring that companies make a profit from the sale of new products based on their inventions.

Successful formation of an institutional structure that is good to the establishment of a developed network of business partnerships with the vector of innovation is possible only in combination with limiting the scope of institutional traps in the form of corruption, administrative barriers, insecurity of property rights.

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Ocena innowacyjności sektorów gospodarczych Naddnieprowskiego Regionu Gospodarczego na Ukrainie

Streszczenie. *Artykuł zawiera porównawczą ocenę innowacyjności ukraińskiego i polskiego przemysłu. Zidentyfikowano główne typy i rodzaje działalności innowacyjnej w różnych sektorach Naddnieprowskiego Regionu Gospodarczego, a każdy rodzaj działalności gospodarczej w regionie został oceniany pod względem intensywności i efektywności rozwoju. Stwierdzono, że najbardziej obiecującym sektorem Naddnieprowskiego Regionu Gospodarczego jest przetwórstwo przemysłowe, w którym innowacje opierają się na rozwoju technologii produkcji i badaniach. Autorzy uzasadniają ekonomicznie działania mające na celu zwiększenie intensywności i efektywności, a co za tym idzie – poziomu innowacyjności kluczowych form działalności gospodarczej w regionie. W tym celu potrzebny jest ekosystem nastawiony na innowacje, który zapewni warunki do prowadzenia badań i rozwoju, tworzenia i rozwoju sieci konsolidujących działalność ośrodków badawczych i produkcji przemysłowej wykorzystującej najnowsze osiągnięcia naukowe; który zapewnia szkolenia profesjonalnej kadry, rzetelną ochronę własności intelektualnej, rozwój klastrów przemysłowych; który ułatwia dostęp do światowych źródeł technologii, wiedzy oraz wysoko wykwalifikowanej kadry inżynieryjno-technicznej.*

Słowa kluczowe: *działalność innowacyjna, przemysł, innowacje, rodzaje działalności gospodarczej*