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## **INNOVATIVE ACTIVITY IN THE INDUSTRY OF UKRAINE: PROBLEMS, RISKS, AND DIRECTIONS OF STEPPING UP**



*The general status and recent positive trends in the innovative activities of enterprises in Ukraine have been discussed. The key challenges and discouraging factors affecting the interest of Ukrainian corporations in innovations have been analyzed. The risks of sustainability of the existing trends in the sphere of innovative and technological development, which can lead to the preservation of outdated structure of the national economy have been identified. The priorities and medium-term measures for overcoming the existing barriers in implementing a new model of economic development based on investments into innovative activities, new industrialization, and industrial recovery have been offered.*

*Key words: innovative activity, industry, scientific sphere, infrastructure, stimulation, financing, and strategy.*

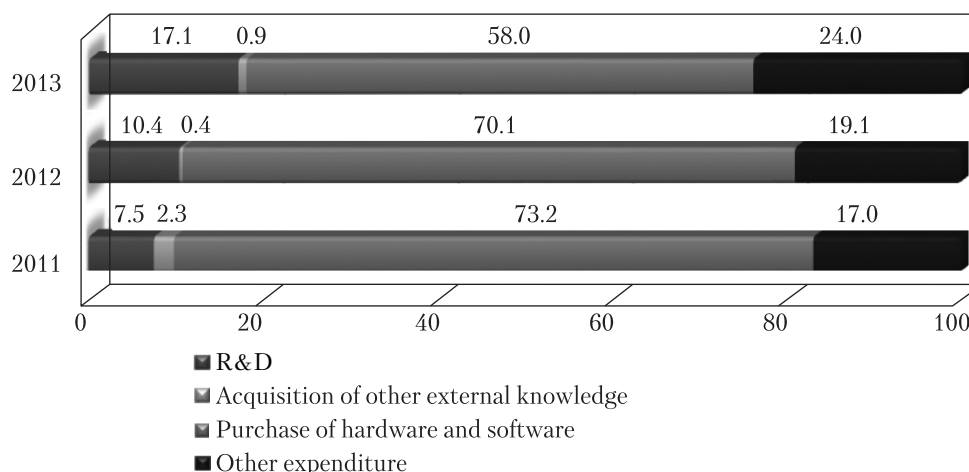
The modern period of world economic development is characterized by deepening of globalization and liberalization of international trade, when the manufacture of industrial goods goes beyond national borders thereby forming a so-called system of international production and distribution relations referred to as «*the global value chains*». As a result of specialization and geographic fragmentation of the manufacture, its more labor-intensive components are usually transferred to the developing countries [1]. In response to the challenges of new global reality, the national industry should encourage and facilitate the innovative activities as the most effective means of improving the competitiveness of enterprises and joining the global value chains under more favorable terms.

However, Ukrainian government still has not formulated its clear attitude towards innovation. In Ukraine, the main problem is a gap between the political statements and the implementation

of government decisions. The government fails to back the official statements on the necessity of innovative economic development by funding, program documents, and mechanisms to encourage the innovative activities. The national innovation policy is elaborated proceeding from the theory of free markets and minimization of its regulation by government, which manifests itself in the rejection of active industrial policy, which ultimately leads to de-industrialization and loss of national technological framework for socio-economic development and undermines the economic security and freedoms.

The lack of approved strategy for the innovation development of Ukraine causes problems with the definition and practical realization of the priority areas of science, technology, and innovation, complicates the formation of the national innovation system and, consequently, hinders the transition of Ukraine's economy to the innovation-based way of development.

The above mentioned problems have drawn a lot of attention from both Ukrainian and foreign



**Fig. 1.** Structure of total expenditure by type of innovation activities in the national industry, %

researchers and scholars. The team of experts of the Institute of Industrial Economics of NAS of Ukraine believe that one of the main ways to address the de-industrialization of national industry is to promote the innovation activities and the development of advanced manufacturing industry [2-4]. Key controversies, objectives, and mechanisms for the effective development of national industry in terms of innovation and technological issues were highlighted by *A. Amosha* [5, 6], *I. Galytsia* [7] *Yu. Kindzerskyi* [7, 8], *L. Fedulova* [9], and *M. Jakubowski* [7].

Despite a large number of publications and researches on the problem in hand, many issues have remained unsolved because of their complexity and novelty. So far, the industrial enterprises have not perceived the innovative activity as major way to create a competitive advantage for profit-making. It is a quite natural trend, given the peculiarities of the economic system of Ukraine focused on subordinating the national economic policy to the benefit of a narrow circle of the people in power instead of serving the national interests.

The objective of this research is to discuss the existing problems of innovative activity of industrial enterprises in Ukraine, to identify the risks of preserving the existing destructive tendencies

in the national industry, and to offer short- and medium-term measures in order to overcome the existing limitations.

The aggravation of socio-political situation in Ukraine in 2013, the economy's stagnation, and the existing economic practice (mass corruption, bureaucracy, corporate raiding (or illegal takeover), and kickbacks as elements of the shadow economy) are among the factors preventing the industry leaders from doing the innovation. According to the State Statistics Service of Ukraine, less than 20 per cent of industrial corporations are involved in the innovative activity (see Table 1), which is well below the threshold (25%) [10, 125] and the leading advanced economies (Germany (81.6%), Belgium (67.4%), Luxembourg (66.1%), Ireland (66.0%), Sweden and the Netherlands (60.3%), Austria (60.2%), and Finland (59.2%)) [11].

It should be noted also that, as a rule, the innovation activity of industrial corporations reduces to the purchase of hardware, as evidenced by the overall structure of innovation expenditure where the cost of hardware and software dominate (see Fig. 1; [12, 173], [13, 185]; [14, 2]).

However, in recent years, a positive trend towards increase in spending on R&D activities has been reported as in 2013 it added 6.7% (as com-

pared with 2012) and 9.6% (as compared with 2011). Despite the fact that in 2013 the innovative activity of industrial corporations decreased slightly, in general, over the past four years, this index grew 1.2 times (as compared with 2010). The share of industrial corporations that have implemented innovations over the same period increased as well; its growth rate accounted for 7.8%. The number of innovative products increased 1.3 times, including new types of machinery, equipment, appliances, and other hardware, which grew 1.2 times. The number of new business processes and manufacturing procedures implemented in 2013 was the lowest in the last three years and accounted for 77.1% as compared with 2010 (see Table 1). Given the structure of expenditure on innovation activities in the industry, one can conclude that decline in innovative activities of industrial corporations in 2013 (as compared with the prior years) was caused by unfavorable socio-economic situation in the country and by a cut in purchase of new equipment, which in 2010–2012 was much higher.

The key problems of the national economy are underdeveloped demand for innovation, its poor quality, and weak market incentives for the development of high-tech industry. There are a lot of reasons for them. *Firstly*, there is no effective system to stimulate innovation activities, as the measures aimed at its development are canceled as the state budget and other laws are revised annually.

*Secondly*, the existing system of R&D funding does not imply any commercialization of R&D results. For the past six years, funding of science in Ukraine varied within 0.74%–0.86% of GDP, not reaching a threshold (over 0.9% of GDP) at which science can significantly impact the development of the economy (see Fig. 2; [12, 77], [15, 72], [16, 95], [17, 89], [18, 67], [19, 81], and [20, 30]). This situation substantially differs from the practice of advanced economies, where material financial resources, including the corporate funds are allocated for R&D activities (see Table 2).

The chronic lack of funding undermines the integrity of R&D structure and continues to ex-

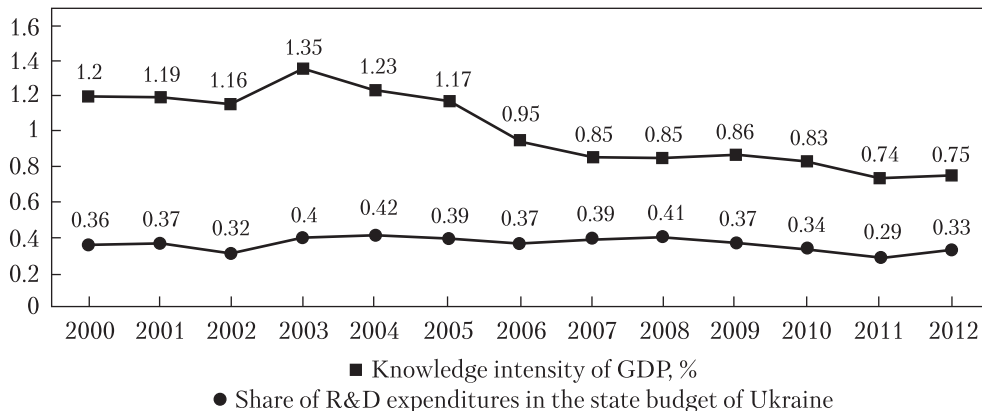
Table 1

Dynamics of Innovation Activity Indices of Industrial Corporations in Ukraine

Parameters	2010	2011	2012	2013
Number of corporations involved in innovative activities (% of the total number of industrial corporations)	1462 (13.8)	1679 (16.2)	1758 (17.4)	1715 (16.8)
Number of corporations who have implemented innovations (% of the total number of corporation involved in innovative activities)	1217 (83.2)	1327 (79.0)	1371 (78.0)	1312 (76.5)
New business processes and manufacturing procedures implemented	2043	2510	2188	1576
Including low-waste and energy saving technologies	479	517	554	502
Innovative products launched, descriptions	2408	3238	3403	3138
Including new machinery, equipment, appliances, and other hardware	663	897	942	809
Innovative products sold (% of the total industrial goods solved), UAH million	33697.6 (3.8)	42386.7 (3.8)	36157.7 (3.3)	35891.6 (3.3)
Innovative products sold overseas (% of the total innovative products sold), UAH million	13713.0 (40.7)	12630.6 (29.8)	13354.9 (36.9)	n/a*

Note. n/a\* no data available.

Sources: [12, 163, 194, 203, 218, 219, 229]; [13, 175, 215, 230, 241]; [14, 1, 2].



**Fig. 2.** The dynamics of knowledge intensity of Ukraine's GDP

haust the staff: recently the number of employees in R&D organizations has decreased by 12.7%, including researchers by 10.6% (see Table 3).

The lion's share of R&D funds is allocated for salaries (in 2013, the salary accounted for 48.5% of the total expenditure; in 2012, it made up 50.7%; in 2011, it amounted to 50.2% [22, 23]), at the expense of upgrading the instruments and equipment. Thus, about 75% of the equipment of R&D institutions and laboratories of NASU has been used for more than 15 years. For comparison, in the advanced economies, the service life of equipment does not exceed 5–7 years [24, 5].

As a result, Ukraine has weak, mostly formal, and unsystematic ties between the research sector and the industry. There is no extensive infrastructure to render marketable state to the R&D results, to promote and to commercialize the research products. The government target economic program for 2009–2013 failed to address the problem of incomplete innovation infrastructure [25].

*Thirdly*, the limited demand for innovations is conditioned by manufacturing processes. The dominance of large businesses in the raw material segment, high monopolization in the majority of manufacturing sectors, limitation of innovation processes at the enterprises that use ready-made technological solutions prevents the industry leaders from funding the R&D sector and from using the R&D products in the future. Moreover, under

the current economic conditions the manufacturers consider the innovative activity unprofitable and even «dangerous» inasmuch as they have no guarantee that the result of their investment in new knowledge and technologies are protected from expropriation by unlawful means [26, 46].

Until this economic model is replaced, the owners of industrial corporations will not be interested in a new model of development based on investments in innovations, large-scale industrialization, and industrial recovery.

Given the above, one could state that currently the priority objective is to elaborate a target government strategy for the innovation development. This economic model implies the following measures:

- ✦ To review the existing draft strategy of innovative development of Ukraine elaborated pursuant to the Resolution of Verkhovna Rada of Ukraine of February 17, 2009, no. 965-VI on the Parliamentary Hearings on the Strategy of Innovative Development of Ukraine for 2010–2020 in the View of Globalization Challenges. For this purpose, it is necessary to establish a committee consisting of representatives of government, industry, science, education, culture, and the general public, who will represent the interests of individual institutions in discussing the long-term objectives of the innovative development of the country as a whole and its regions,

in particular. The outcome of the commission's work should be updated (in order to meet new challenges of deepening regionalization, globalization, and liberalization of world trade) strategy (in the form of draft law) to be submitted to Verkhovna Rada of Ukraine for approval;

✦ To elaborate and to adopt the regional innovative development strategies, to «reformat» the existing regional strategies of socio-economic development in accordance with the basic provisions of the revised strategy of innovative development of Ukraine;

Table 2

**Investments and Government Support of R&D  
in the EU Member States and in Ukraine (as of 2013)**

Country	General expenditure on R&D works (GERD), % of GDP	Government expenditure on R&D works, % of GDP	Share of business entities in the GERD, %	Venture funding of R&D works, % of GDP
Belgium	2.22	0.70	68.5	0.307
Bulgaria	0.63	0.24	61.9	0.038
Czech Republic	1.88	0.87	53.7	0.056
Denmark	2.98	1.02	65.8	0.296
Germany	2.91	0.96	67.0	0.223
Estonia	2.15	0.90	58.1	n/a*
Ireland	1.73	0.53	69.4	0.196
Greece	0.69	0.45	34.8	0.045
Spain	1.29	0.61	52.7	0.192
France	2.23	0.78	65.0	0.307
Italy	1.22	0.53	56.6	0.138
Cyprus	0.40	0.34	15.0	n/a
Latvia	0.66	0.51	22.7	n/a
Lithuania	0.90	0.66	26.7	n/a
Luxembourg	1.49	0.49	67.1	0.538
Hungary	1.28	0.43	66.4	0.224
Malta	0.83	0.33	60.2	n/a*
Netherlands	2.15	0.93	56.7	0.300
Austria	2.83	0.88	68.9	0.134
Poland	0.89	0.56	37.1	0.234
Portugal	1.38	0.68	50.7	0.213
Romania	0.42	0.30	28.6	0.137
Slovenia	2.79	0.63	77.4	n/a*
Slovakia	0.82	0.48	41.5	n/a*
Finland	3.42	1.09	68.1	0.310
Sweden	3.39	1.08	68.1	0.289
UK	1.74	0.60	65.5	0.419
Croatia	0.75	0.41	45.3	n/a*
EU27**	2.06	0.75	63.6	0.277
Ukraine	0.75 <sup>2012</sup>	0.33 <sup>2012</sup>	23.3 <sup>2012</sup>	n/a*

Note. <sup>2012</sup> data for 2012; \* no data available; \*\* generalized data for the EU with Croatia, the 28<sup>th</sup> Member State, excluded.

Sources: [12, 77]; [20, 30]; [21].

Dynamics of Number of Employees of R&amp;D Institutions by Staff Categories

	2010		2011		2012		2013	
	Total, employees	% of the total	Total, employees	% of the total	Total, employees	% of the total	Total, employees	% of the total
<b>Total</b>	<b>141086</b>	<b>100.0</b>	<b>134741</b>	<b>100.0</b>	<b>129945</b>	<b>100.0</b>	<b>123219</b>	<b>100.0</b>
Researchers	73413	52.0	70378	52.2	68599	52.8	65641	53.3
Technicians	16151	11.4	14591	10.8	13433	10.3	12212	9.9
Supporting staff	26032	18.5	24779	18.4	23866	18.4	22649	18.4
Others	25490	18.1	24993	18.6	24047	18.5	22717	18.4
Including								
Doctors of Science	4478	3.2	4417	3.3	4489	3.5	4533	3.7
Candidates of Science	16944	12.0	16203	12.0	15963	12.3	15919	12.9

Sources: [12, 36]; [19, 41]; [22]; [23].

- ✦ To specify in details the list of the current innovation priorities as fundamental, key elements of the state innovation policy<sup>1</sup>, for each of which a comprehensive national program must be initiated to combine all components of the national innovation system;
- ✦ To prepare proposals for gradual increase (over 2015–2020) in the share of budget funding of R&D activities to 1.7% of GDP and to submit the respective proposals to Verkhovna Rada of Ukraine till June 1, 2015.

In the medium term (a 3–5 year period) the Cabinet of Ministers of Ukraine should implement the following measures:

1) To make an inventory of existing organizational forms of cooperation between the science and the industry; on the basis of its results to prepare proposals for improving the effectiveness of joint efforts and to extend the list with new forms based on the principles of PPP, including, the technology platforms. In this context, to consider a draft resolution of the Cabinet of Ministers of Ukraine on Approval of the Concept of Technology

<sup>1</sup> Currently, Ukraine uses front-end local approach to determining the innovation priorities that contradicts the international experience. For example, Japan has 6, Spain has 5, South Korea and the Netherlands have 4, and the UK has 2 priority directions of innovation development. Ukraine should have about the same number of priorities.

Platforms in Ukraine [27, 8] elaborated by the State Agency for Science, Innovation, and IT Development of Ukraine in 2012. To set forth the use of public-private partnerships in the field of innovation, especially for the creation of state-of-the-art technologies, the development of innovation infrastructure, and for the financing of individual links of innovation chain;

2) To draft the state target economic program on integration of academic science and the industrial sector of the economy for the next 5–10 years, which would determine the trends and mechanisms of joint activities in the research and innovation field; and

3) To draft the Law of Ukraine on the development of the national innovation system; to revise the Law of Ukraine on the innovation activity in terms of its amendment with section «Infrastructure to Support the Innovation Activities» for determining the role and place of innovation infrastructure, types of innovation infrastructure, mechanisms for the promotion of innovative development, as well as the tools for supporting the operation and development of innovation infrastructure by central and regional authorities.

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**ИННОВАЦИОННАЯ ДЕЯТЕЛЬНОСТЬ  
В ПРОМЫШЛЕННОСТИ УКРАИНЫ: ПРОБЛЕМЫ,  
РИСКИ, НАПРАВЛЕНИЯ АКТИВИЗАЦИИ**

Освещено общее состояние и положительные тенденции инновационной деятельности промышленных предприятий Украины в последние годы. Проанализированы ключевые проблемы и демотивирующие факторы повышения заинтересованности промышленных предприятий в инновациях. Определены риски сохранения имеющихся тенденций в сфере инновационно-технологического развития промышленности, которые могут привести к консервации устаревшей структуры национального производства. Предложены первоочередные и среднесрочные меры по преодолению существующих ограничений в реализации новой модели экономического

развития, основой которой являются инвестиции в инновационную деятельность, новая индустриализация и промышленное обновление страны.

*Ключевые слова:* инновационная деятельность, промышленность, научная сфера, инфраструктура, стимулирование, финансирование, стратегия.

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**ІННОВАЦІЙНА ДІЯЛЬНІСТЬ  
В ПРОМИСЛОВОСТІ УКРАЇНИ: ПРОБЛЕМИ,  
РИЗИКИ, НАПРЯМИ АКТИВІЗАЦІЇ**

Висвітлено загальний стан та позитивні тенденції інноваційної діяльності промислових підприємств Украї-

ни в останні роки. Проаналізовано ключові проблеми та демотивуючі чинники підвищення зацікавленості промислових підприємств в інноваціях. Визначено ризики збереження наявних тенденцій у сфері інноваційно-технологічного розвитку промисловості, які можуть призвести до консервації застарілої структури національного виробництва. Запропоновано першочергові та середньострокові заходи щодо подолання наявних обмежень в реалізації нової моделі економічного розвитку, основою якої є інвестиції в інноваційну діяльність, нова індустріалізація і промислове відновлення країни.

*Ключові слова:* інноваційна діяльність, промисловість, наукова сфера, інфраструктура, стимулювання, фінансування, стратегія.

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