

# Evaluation of innovation activity of enterprises in Ukraine

## Evaluación de la actividad de innovación en empresas ucranianas

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Received: 19/06/2019 • Approved: 30/09/2019 • Published 07/10/2019

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#### ABSTRACT:

In modern conditions, the main resource is knowledge and information and intellectual technologies that help to solve an issue of limited natural sources. The relevance of the article is that the evaluation of innovative activity of an enterprise plays a leading role in the characteristic of its operating. The purpose of the article is to consider innovative activity of Ukrainian enterprises. The article has considered the essence of innovative activity; notions of innovative products have been studied; approaches to analysis of innovative activity; the innovative activity of economic entities of the national economy has been reviewed.

**Keywords:** Innovations, innovative activity, innovative products, innovative expenses, innovative intensity

#### RESUMEN:

En las condiciones actuales de desarrollo y operación de negocios, el recurso clave es el conocimiento y la tecnología de información inteligente que ayudan a resolver el problema de la escasez de recursos naturales. La relevancia del artículo es que la evaluación de la actividad innovadora de la empresa ocupa un lugar destacado en la caracterización de su funcionamiento. El propósito del artículo es considerar la actividad innovadora de las empresas ucranianas. El artículo aborda la esencia de la actividad innovadora; se investigó el concepto de productos innovadores; se definieron enfoques para el análisis de la actividad innovadora de la empresa; Se revisó la actividad innovadora de las entidades empresariales de la economía nacional.

**Palabras clave:** Innovación, actividad innovadora, productos innovadores, costos innovadores, actividad innovadora

## 1. Introduction

In recent years Ukraine has transferred from export of production of heavy industry to advanced technology products and services. It is worth noting that precisely the high-technology sectors of Ukrainian economy are the most attractive for foreign investments. Development centres, development of software and equipment, joint aerospace projects are only separate examples of such cooperation. In addition, there are a large number of

promising projects in Ukrainian infrastructure, agriculture, nuclear energy, oil and gas sector, biotechnology and pharmacology (Yakymenko, 2012; Usik, 2017). Ukraine develops and that is why now is the best time to invest in new business possibilities. The main form of implementation of scientific achievements and acceleration of productive processes is innovation. In modern conditions of development and functioning of enterprises, the main resource is knowledge and information are intellectual technologies that help to solve an issue of limited natural sources. That is why evaluation of innovative activity of an enterprise plays a leading role in the characteristic of its operating. Additionally, development of mechanisms to stimulate innovative activity of economic entities remains the relevant subject of researches and discussions in domestic economic thinking and practice.

Modern economic practice demonstrates that enterprises can achieve high results only with systematic and purposeful innovation aimed at finding opportunities that economic environment may give regarding production and introduction of new types of goods, new industry and transport means, development of new markets and forms of organisation of production. This implies especial innovative style of management, in the basis of which is focus on innovations, systematic and purposeful activity. Competitive advantages are being achieved thanks to introduction of innovations – totally new methods and techniques of industry and commercial activity. The search for new idea is the respond of business entities to reduced income of their activities conditioned by certain market sector glut of certain goods. The possibility to create and use innovations by economic entities depends on the general level of scientific and technological progress of a country and resources (Lochan *et al.*, 2015). That is why evaluation of innovative policy of an enterprise plays a leading role in the characteristic of its operating, determination of efficiency indicators of enterprises and development of the mechanism to stimulate its innovative activity.

Different aspects of innovative activity have been researched by many scientists (Buniak, 2011; Golovach, 2014; Donets, 2012; Ivchenko, 2008; Ilyashenko, 2003; Pererva and Romanchik, 2018; Shpankovskaya *et al.*, 2012; Savchuk, 2003; Shostak, 2016; Bazhal, 2015; Ackoff, 1978; Vodachek and Vodachkova, 1989; Drucker and MacIarello, 2010; Schumpeter, 1982). In researches they analyse theoretical foundations of the innovative component of business, resources to implement innovations, factors of innovative development, modern tendencies of development of innovation world market, consider issues of state regulation of innovative and investment activity, etc. (Kovalchuk, 2004; Kvasnitskaya and Ardshkina, 2009; Levytsky and Sukhanova, 2014; Slavuta, 2013; Tulchynska, 2008) and others researched characteristic of modern state of innovative activity in Ukraine in their studies. However, in general problematics of implementation of the model of innovative business development, it is still relevant to develop interconnected indicators of analysis of innovative activity of an enterprise, as well as to study main factors of stimulation of innovation and investment activity of business entities, which determines the relevance and choice of research focus (Vodachek and Vodachkova, 1989; Filatov *et al.*, 2018).

In modern science, enterprises are active if they are engaged in innovative activity, which is all scientific, technological, organisational, financial and commercial actions that really lead to implement innovations or aimed at this purpose (Tsiglyk *et al.*, 2004; Yokhna and Stadnik, 2005; Ostanina *et al.*, 2016; Silagadze, 2019). Implantation of innovations means introduction of new or significantly improved product (service, goods) or process, new method of marketing or new organisational method in activity of an enterprise, organisation of jobs or external connections (Ilyashenko, 2003). In its turn, innovative product is product, which is new or its properties or ways of using are significantly improved (Chukhray and Patora, 2006; Plaskova *et al.*, 2017). New products are goods and services, which essentially differ in their characteristics or purpose from products manufactured by an enterprise earlier. Significant improvements may be made through changes in materials, components and other product features that improve their properties. It includes improvements of technical characteristics, components and materials, software and other functional characteristics (Chukhray and Patora, 2006; Lochan *et al.*, 2015).

The purpose of the article is to consider innovative activity of domestic enterprises using analysis and evaluation of respective statistical indicators. To achieve this purpose is possible by completing a number of tasks, in particular: to consider the essence of innovative activity of enterprise; to research the notion of innovative products; to determine approaches to analyse innovative activity of an enterprise; to study a system of indicators to analyse innovative activity; to evaluate innovative activity of enterprises of national economy.

## 2. Methodology

In the process of researching theoretical materials and processing practical data, we used such interconnected scientific research methods as historical method, analysis and synthesis, tabular method, modern methods of statistical analysis in order to reveal certain patterns as well as method of theoretical analysis, which was used to formulate the main ideas and conclusions of the research. For statistical data, the whole territory of Ukraine was selected (24 regions and the capital Kyiv). According to results of the research, modern tendencies of innovative activity in domestic economy have been generalised. According to data of State Statistics Service of Ukraine, in 2017, 579 enterprises (or 16.2% of those surveyed) were engaged in innovative activity that is represented in Table 1.

**Table 1**  
The number of enterprises engaged in innovative activity

Indicators	Number of enterprises, units
Total:	759
had costs of innovations	631
introduced innovations, in particular:	672
• introduced innovative types of products	358
• introduced new processes	456
• market innovative products that is reintroduced or undergone significant technological changes over the past three years	450

**Source:** According to materials of annual state statistical report (Science, technology and innovation. The report of State Statistics Service of Ukraine... 2019).

The method of analyzing allowing to assign, is just at the context of the further analysis of the rest of the world, to the points of view of the military and foreign sciences, on the drive of the utmost understand the concept of innovation of the new spirit:

- a process aimed at the development and implementation of the results of the final research and development or other scientific and technological advances in a new or improved product realized on the market in a new or improved technological process used in practice, as well as related additional scientific research and development;
- the activity of the team, aimed at ensuring the advent of scientific and technological ideas, inventions to the result, suitable for their practical application and implementation in the market in order to meet the needs of society in competitive goods and services;
- activities related to the transformation of scientific research and development, as well

as inventions and discoveries into a new product or a new technological process that is being introduced into the production process;

- the process of creating a new product from the formation of the idea to the development of production, production, implementation and obtaining commercial effect;

- activities related to the transformation of the results of research and development into a new product, advanced technological process or a new approach to social services, aimed at the use and commercialization of these results, the launch of new competitive goods and services on the market and is an integral part production and economic activity of the enterprise oriented to the renewal and improvement of its productive forces and organizational and economic relations. Such different approaches to the interpretation of innovation activities are due to the multidimensionality of this economic concept, its complexity, the variety of areas of application.

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### **3. Results and Discussion**

Innovative activity of an enterprise is considered at two levels: macro- and micro-level (Illyashenko, 2003; Shpankovska *et al.*, 2012). On a macro-level sphere of competence regarding regulation of innovative activity includes development and implementation of state innovative policy as the holistic multi-layer system of measures to form, preserve and distribute new knowledge and technologies, development and activation of innovative potential. At the micro-level the role of an enterprise is in development and introduction of new creative technologies on the basis of own scientific achievements and innovations that market offers (Illyashenko, 2003; Shpankovska *et al.*, 2012).

Scientific approaches to analysis of innovative activity of an enterprise have many similarities with evaluation of investment activity, but, in the opinion of domestic scientists (Vasylenko and Shamtko, 2003; Grinko, 2010), also have certain differences: in addition to solving commonly accepted analytical tasks, in analysis of innovative activity it is necessary to evaluate innovative activity that is characterised by an increase in the share of innovative products, an increase in the share of borrowed funds in innovative processes. Transfer to innovative socially focused type of development of enterprise strengthens the requirements for the quality of managerial decisions regarding the substantiation of innovative development strategies.

Method of analysis and evaluation of investment and innovative activity on state level is determined by a number of normative legal acts of bodies of legislative and executive branches, on the basis on which both state and commercial and government structures conduct researches and ratings. Thus, for example, the Decree of the Cabinet of Ministers of Ukraine "On Amendments to the Decree of the Cabinet of Ministers of Ukraine dated December 18, 2003 No. 779" No. 67-r dated January 25, 2012 (On Amendments to the Decree..., 2012), has adopted the decision that State Agency for Investments and National Projects of Ukraine must introduce a complex comparative generalized research of investment climate of regions with determining the rating of their investment attractiveness and each year report to the Government regarding investment attractiveness of regions and their rating.

The Law of Ukraine "On Priority Areas of Innovation Activity in Ukraine" dated December 5, 2012, no. 3715-VI (On Priority Areas..., 2012) determines strategically prioritised focuses on innovative activity in the near future:

- 1) New technologies of energy transportation, energy efficient, resource efficient technologies, alternative sources of energy;
- 2) New technologies of high-technologies development of transport system, rocket and space area, air- and shipbuilding industries, armament and military equipment;
- 3) New technologies for the production of materials, their processing and connection, the creation of the industry of nanomaterials and nanotechnologies;
- 4) Technological update and development of agribusiness;
- 5) New technologies and equipment for the better medical care, treatment, pharmaceuticals;

6) Wide usage of technologies of more ecological production and protection of the environment;

7) Development of modern information, communication technologies, robotics.

In the context of the draft law and a number of other legal acts that determine the list of the main focuses of innovative activity and order of their implementation, State Statistics Service, respective services of local self-government bodies, domestic rating agencies, state institutions and commercial structures conduct independent monitoring of results and achievements in the sphere of innovations, analyse innovations by directions, sectors of economy, cities and regions and evaluate state and development of innovative potential of Ukraine.

To analyse innovative activity of an enterprise, the system of interrelated indicators can be used; indicators are grouped into three main blocks:

1) Investment in innovations, a number of new technologies of production, a number of new types of production, an amount of production of innovative products in physical and value terms, an amount of knowledge-based product in physical and value terms, an amount of export of innovative and high-technology knowledge-based products in physical and value terms;

2) A share of new technologies in their total number, a share of innovative types of products in their total amount, a share of complicated knowledge-based products in total production, quality indicators of specific products, a share of innovative products in market size;

3) An increase in financial result, payback period of innovations, an average duration of the innovation process, a share of workers whose working conditions have been improved (Savchuk, 2003).

The first and the second blocks of indicators are intended to provide quantitative and qualitative characteristics of innovation activity, and the third – to assess its effectiveness.

Analysis of scientific developments and knowledge of statistical information regarding innovation activity of domestic enterprises and organisations demonstrate the dominance of industry and large businesses, although medium-sized businesses are moving towards innovative ideas to improve their performance. This tendency is explained by dominating role of huge industry enterprises in introducing innovation that at the expense of many factors, in particular: high level of material, organisational, technical and financial resources; possibility to use big powers; and support of a government.

Among the regions above the average in Ukraine, the share of innovation-intensive enterprises was in Kharkiv, Ternopil, Mykolaiv, Cherkasy, Kirovograd, Ivano-Frankivsk, Zaporozhye, Sumy oblasts and Kyiv (State Statistics Service of Ukraine... 2019). From the perspective of types of economic activity, it is necessary to highlight enterprises that produce basic pharmaceuticals and pharmaceuticals (53.8%), other vehicles (37.1%), computers, electronic and optical products (34.0%), drinks (25.9%), electrical equipment (25.2%), chemicals and chemical products (25.0%) (State Statistics Service of Ukraine).

In the past year, enterprises spent UAH 9.1 billion on innovation, including the purchase of machines, equipment and software – UAH 5.9 billion, on internal and external scientific and development – UAH 2.2 billion, for the purchase of other external knowledge (purchase of new technologies) – UAH 0.02 billion and for other work related to the creation and implementation of innovations (other costs) – UAH 1.0 billion. The largest amount of money was spent by enterprises of Kyiv, Zaporozhye, Dnipropetrovsk and Kharkiv regions. Among the types of economic activity are enterprises producing machinery and equipment not attributed to other groups (13.5%), other vehicles (13.3%), food products (12.6%).

According to the data of State Statistics Service, the main source of financing innovative costs is own funds of enterprises – UAH 7704.1 million (or 84.5% of the total costs of innovations) (State Statistics Service of Ukraine). 8 enterprises were financed by the

state budget funds and 17 by local budgets, the total amount of which is UAH 322.9 million (3.5%). The funds of domestic investors received 5 enterprises, and foreign ones – 3. In total, their amount is UAH 380.9 million (4.2%). 21 companies benefited from crediting, amounting to 594.5 million UAH (6.5%).

Over recent years (2017-2018) about 88.5% of innovation-intensive industry enterprises implemented innovations (14.3 of surveyed). As analysis of statistical data demonstrates, industry enterprises implemented 2387 innovative types of products, 477 of which are new exclusively for the market, 1910 are new only for the enterprise. Of the total number of products introduced, 751 are new types of machinery, equipment, devices, vehicles, etc. The biggest amount of innovative types of products was introduced at Kharkiv enterprises (16.6% of the total number of introduced types of innovation products), Zaporizhzhya (13.4%), Lviv (10.3%), Sumy (9.1%) oblasts and Kyiv (8.3%). By types of economic activity in innovation introducing, the leading enterprises were enterprises that produce machinery and equipment, not attributed to other groups (23.9%), food products (21.4%), basic pharmaceutical products and pharmaceuticals (7.8%) are leading the introduction of innovations (Science, technologies and innovations. Report of the State Statistical Service of Ukraine).

By the number of introduced innovative technological processes (new or improved methods of processing and production of products), which in total was 1831, leading are enterprises of Kyiv (30.0%), Kharkiv (12.6%), Sumy (12.3%) , Zaporizhzhya (7.8%) and Dnipropetrovsk (5.8%) oblasts; and by the types of economic activity, in the context of this characteristic, leading are enterprises manufacturing machinery and equipment not included in other groups (18.8%), natural gas production (17.7%), manufacture of finished metal products, except machinery and equipment (13.4%), and food products (7.9%). Of the total number of innovative technological processes implemented, low-waste and resource-saving are 611 units. Generalised information regarding innovative activity of domestic enterprises according to the data of State Statistical Service of Ukraine by regions is represented in table 2 (State Statistical Service of Ukraine... 2019).

**Table 2**  
Innovative activity of industry  
enterprises by regions

Region	The number of innovation-intensive enterprises		Total sum of expenses on innovative activity, mln. UAH	Sales volume for innovative products in total, mln. UAH
	in total, units	in % to the total number of surveyed enterprises		
<b>Ukraine</b>	<b>759</b>	<b>16,2</b>	<b>9117,5</b>	<b>17714,2</b>
Vinnitsa	24	15.4	100.4	454.7
Volyn region	17	16.0	162.1	66.8
Dnipropetrovsk	51	11.0	1127.3	297.8
Donetsk	22	11.5	725.3	3301.9
Zhytomyr	23	13.9	10.4	155.9
Transcarpathian	12	9.0	26.2	358.1
Zaporozhye	42	19.1	1393.4	4041.2

Ivano-Frankivsk	28	21.7	134.2	105.4
Kievskaya	37	11.0	289.7	770.6
Kirovogradskaya	24	22.6	504.2	405.6
Lugansk	7	10.0	20.2	13.1
Lviv	48	15.2	310.1	763.1
Nikolaev	25	26.9	324.9	417.3
Odesa	36	15.7	150.1	157.6
Poltava	27	10.4	68.2	243.2
Rivne	8	5.9	7.3	9.3
Sumy	24	20.5	598.5	601.9
Ternopil	25	27.5	109.7	126.9
Kharkiv	111	28.1	890.9	2515.9
Kherson	15	15.5	56.1	287.6
Khmelnitsky	8	5.7	24.6	27.8
Cherkassy	32	24.4	124.7	583.1
Chernivtsi	8	14.5	26.1	46.3
Chernihiv	10	9.6	71.7	345.4
c. Kyiv	95	20.7	1861.2	1617.7

**Note:** Data exclude the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and a part of temporarily occupied territories in the Donetsk and Luhansk regions.

According to the researched, the general tendency of innovative activity of enterprises is of slow, but developing character. Thus, for 2017-2018, as a result of innovative, 8 enterprises have created new technologies, of which 59 have been transferred to other enterprises, in particular 2 – outside Ukraine.

As it was mentioned above, innovations are newly created or improved competitive technologies, products or services and organisational and technical solutions of production, administrative, commercial or other nature, which essentially improve structure and quality of production or social sphere (Bukovetska, 2014). Innovative activity of enterprise is complex process of creation, use and distribution of innovations in order to get competitive advantages and increase profitability of production. In the market economy, this activity is the most essential factor that gives a company an opportunity to hold strong market positions and gain an advantage over competitor in the sphere of his or her commercial interests (Jedzhula *et al.*, 2017).

According to the data of the official statistical observations, only in the last year, 450

enterprises which were engaged in innovative activity, marketed innovation products of UAH17.7 billion, of which 39.8% exported it of UAH5.5 billion. Almost one in four companies marketed new production, the amount of which was UAH4.5 billion (export – 41.5%). To introduce innovations, 170 domestic enterprises purchased 832 new technologies, of which 129 – outside Ukraine; Of the total number of technologies, 386 were purchased with equipment, of which 81 were outside Ukraine; 305 – as a result of research and development (10); 110 – under contracts for the acquisition of rights to patents, licences for the use of inventions, industrial designs, utility models (36); 10 – for agreements on the acquisition of technologies (2); 12 – together with the purposeful recruitment of qualified specialists (Science, technology and innovation. The report of the State Statistics Service of Ukraine... 2019).

All the above data demonstrate the certain positive moment of domestic economy on innovative business, especially, under the conditions of simplified access to EU markets currently enjoyed by Ukraine. Optimistic increases demonstrate the main areas of real economy: building, trade, transport, etc. the most important aspect of such processes is forming a new format of business, opportunity for Ukrainian company to engage in actual world processes, in which advanced technologies and innovations are at the first place.

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## 4. Conclusions

The importance of innovation for both the individual enterprise and the economy as a whole is very important because it is considered as the factor of competitiveness of products, efficiency of usage of productive resources, increase of adaptability of enterprises to the conditions of the environment, expansion of enterprises' opportunities for entering new markets, creation of conditions for long-term economic stability.

The existing method of evaluation of innovative activity of an enterprise allows using different quantitative parameters of the innovative component of technological processes during managing productive activity of enterprises, as well as make more informed management decisions in this area. Each economic entity needs to know theoretical foundations, patterns of formation process, structure, sources of increase, methods of evaluation and focuses of effective operation of innovative potential. Potential of innovation factor should be one of the key conditions of development for large, medium and small business entities. This approach is focused on providing efficiency of enterprises' economic activity and increasing innovative activity that is important to achieve strategic goals. Today there are many factors, which impede the qualitative development of such enterprises. That is why the improvement of business and investment climate in Ukraine, stimulation of innovation-intense activity of domestic enterprises should become one of the key priorities of the state to strengthen and integrate national economy.

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Revista ESPACIOS. ISSN 0798 1015  
Vol. 40 (Nº 34) Year 2019

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