

# ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

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## INNOVATION DEVELOPMENT OF UKRAINE: CURRENT STATE, PROBLEMS AND WAYS OF THEIR SOLVING

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**Introduction.** Ukraine, as other similar post-soviet countries, has a high industrial, research and development potential. However, there is a discrepancy between the country's scientific, human, technological potential and the overall productivity of economy, which is caused by the poor national innovative system. Lack of funding and inefficient government policy on innovation constitute the principal obstacles to the development of the high-tech sector, result in the number of scientists decrease, diminish economic returns in the form of successfully completed projects and hamper their commercial application in the national economy. Negative structural changes were caused by the low level of innovation activity amongst the majority of Ukrainian enterprises. The values of indicators concerning basic innovation activities (e.g. the number of new technologies, the number of inventions, etc.) went down 5-15 fold comparing to 1990s. The share of innovative industrial enterprises keeps declining from year to year (from 18 % in 2000 to 16.1 % in 2014), investments in innovation activity is diminishing (by 46.3 % during 2010-2014 in current prices). Today, the share of enterprises, engaged in innovative activity in EU-countries, amounts to 53%. The biggest number of innovative enterprises is in Germany (79.3%).

A significant aspect, in the context of innovation performance, is the relatively low level of applied knowledge transformation into innovation activity. The share of applied research in total expenses on Ukrainian R&D has been lower than the share of expenses on fundamental research since 2001. The share of Ukrainian medium and high-tech R&D in total manufacturing R&D expenditures (65% in 2009) is similar to the EU-15 average. But the total volume of innovation expenses is relatively small, and very often these expenses are not directed to commercially promising applications or new efficient processes.

The governments of Ukraine did not pay adequate attention to innovation development. In Ukraine, until now there is no functioning system of technologies' transfer and innovation development support. At central level there are many institutes engaged in the strategic development of innovations, but distribution of responsibilities between them is unclear, logical conception of the innovation processes promotion and technologies transfer is absent. As a result of these factors, Ukraine is lagging behind other European countries as to the innovation activity level. For increasing indexes of industrial enterprises' innovation activity, for ensuring the level of applied knowledge

transformation into innovation activity, it is very important to identify the key problems in this sphere and ways for their solving.

**Resent research and publication analysis.** Innovation is widely discussed by foreign and national scholars. Significant contribution to the innovation theory was made by foreign researchers: J. Shumpeter [1], N. Kondratiev [2], R. Solow [3], M. Porter [4] and others. Various aspects of the of innovation and economic development correlation are studied in the works of Ukrainian scientists: A. Amosov [5], V. Heyets and V. Semynozhenko [6] and others. It is extremely important to continue research on the theoretical basis development and practical recommendations for innovation development of Ukraine.

**The aim of the research** is to identify key problems, which restrain innovative activity of industrial enterprises, and to develop measures on stimulating innovation development in Ukraine.

**Description of the main research materials.** A high level of resource and especially energy consumption of Ukraine's industry is caused by its low technological level. One of the main problems of Ukrainian economy is a critical state of the fixed capital, whose average degree of wear and tear was 57% in 2012. The most critical situation is at the metallurgical enterprises, where the degree of the fixed capital depreciation is 89.5%, and at the enterprises producing vehicles, where the wear rate of the fixed capital amounts to 70.6% (the average index in machine-building is 64%).

To improve their facilities, industrial enterprises should make more energetic efforts towards investments and innovation. The analysis of investment activity data indicates deterioration in the structure of industrial production investments, where basic industries' share is growing rapidly. As of 2011 year-end, nearly one third of all investment resources (28.5%) received by the industry was sent to the mining and quarrying industry, 23.6% – to the electricity, gas and water supply, 10.5% – to the manufacture of basic metals and fabricated metal products, except machinery and equipment. In 2012, this disparity deepened: 30.6% of industrial investments was sent to the mining and quarrying industry, of which 22.9% – to the extraction of fuel and energy resources; 27.4% – to the electricity, gas, steam and air-conditioning supply; 9% – to the metallurgy (figure 1) [7].

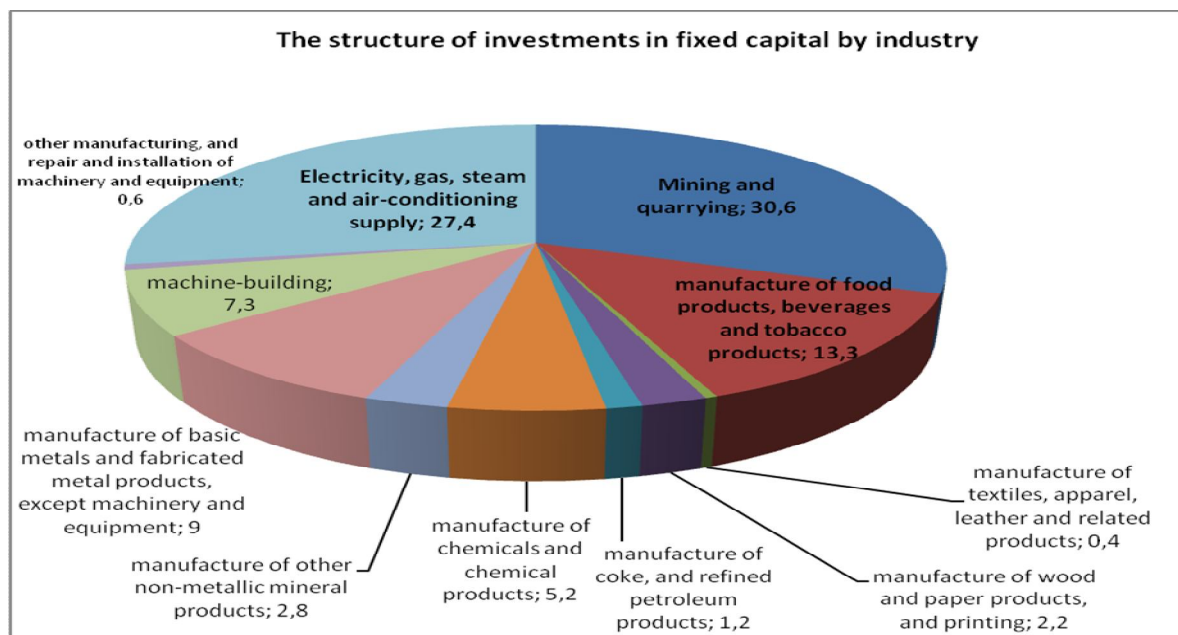


Figure 1. The structure of investments in fixed capital by industrial sectors [8].

In 2013, the share of financing from the State budget in the structure of investments in the fixed capital was 2.5% (2 times less than in 2012). There are significant fluctuations in the investments intensity according to the type of industrial activity (Table 1). In the electricity, gas, steam and air-conditioning supply investment intensity (ratio of investment in the fixed capital to the volume of sold products) increased from 6.1% in 2005 to 15.2% in 2013. In most of the industrial sectors the investment intensity fell, besides the machine-building, where was an increase from 3.8% to 5.3%.

**Table 1**

**The level of industrial enterprises investment activity (%)**

	2005	2011	2012	2013
Industry	7.5	6.5	9.3	8.7
1. Mining and quarrying	20.9	16.8	23.5	15.4
2. Manufacturing	6.3	4.7	5.8	5.5
2.1 manufacture of food products, beverages and tobacco products	8.4	5.5	7.5	6.9
2.2 manufacture of textiles, apparel, leather and related products	9.8	5.2	4.9	4.4
2.3 manufacture of wood and paper products and printing	9.5	8.5	7.4	7.8
2.4 manufacture of coke and refined petroleum products	4.5	1.9	2.2	1.2
2.5 manufacture of chemicals and chemical products, rubber and plastics products, and other non-metallic mineral products	9	6.6	7.2	5.8
2.6 metallurgy	5.4	3.7	4.4	4.3
2.7 machine-building	3.8	3.8	5.4	5.3
2.8 other manufacturing	4.1	4.7	5.7	7.2
3. Electricity, gas, steam and air-conditioning supply	6.1	6.8	12.4	15.2

Calculation based on information – [www.ukrstat.gov.ua](http://www.ukrstat.gov.ua)

Profit is one of the main sources of enterprises' own funds for investment and innovation activities. The slowdown in the global economy and reduced demand in foreign markets for the products of Ukrainian producers negatively impact the financial results of Ukrainian enterprises. In 2013, enterprises of metallurgy, producing coke and refined petroleum products, chemicals and chemical products, had negative financial results (table 2).

**Table 2**

**Profit and losses of industrial enterprises in Ukraine, Million UAH [9]**

	2011	2012	2013
Industry	32230	2592	14444.4
1. Mining and quarrying	20539	8827	15950.9
2. Manufacturing	4202	- 11572	- 3808.1
2.1 manufacture of food products, beverages and tobacco products	2256	7184	9135.1
2.2 manufacture of textiles, apparel, leather and related products	171	20	109.1
2.3 manufacture of wood and paper products and printing	450,8	508	916.7
2.4 manufacture of coke and refined petroleum products	-2276	-4324	-1241.0
2.5 manufacture of chemicals and chemical products	-1266	-7118	-8196
2.6 metallurgy	-6040	-16380	11976.2
2.7 machine-building	10778	-9269	5581.9
3. Electricity, gas, steam and air-conditioning supply	7489	5338	3646.7

Innovations suggest an essential tool to contribute to the decrease of energy and resources consumption by industrial companies. In 2012, 1758 companies (17.4%) performed innovation activities, in 2011 – 1679 companies (16.2%), 2010 – 1462 enterprises (13.8%). The most active are machine-builders (426 companies), food and tobacco producers (420); producers of chemical products (189), steel-makers and producers of metal articles (144) [10].

In 2012 the highest level of the enterprises engaged in the innovative activity was observed in production of coke and refined petroleum products (31.6%) and in machine-building (24.7%); producers of chemical products and food industry rank third and fourth respectively (Figure 2).

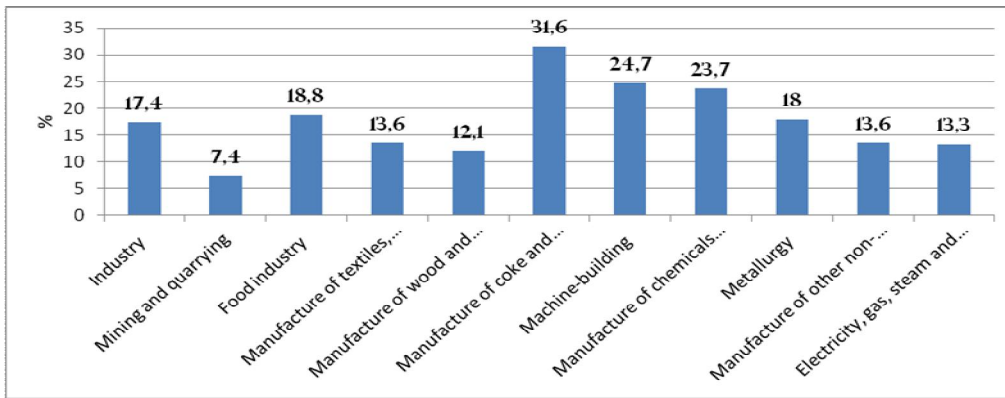


Figure 2. Share of the enterprises engaged in innovative activity (in % to the total number of enterprises)

Over 2009-2011 years the total cost of innovation has been growing steadily, but in 2012, this figure decreased by 1,2 times compared to 2011 and amounted to 11480,6 million UAH. The data analysis shows that purchase of machinery and equipment is associated with innovations implementation, as well as research and development is the most financed. Innovative investments have become 'more diversified' over time. The share of investments in new equipment has dropped since 2000, but the share of organizational innovation in comparison to the total investments has almost doubled. At the same time, enterprises spend less on their own R&D and more on the purchase of new technologies from external sources.

A calamitous reduction of funding for scientific research occurred during the period of market transformation including cutting down of funds for research equipment. The main source of innovation financing is enterprises' own funds. Business effort in R&D and innovation is however higher than the state effort. In 2012, the total government research budget accounted for 2% (1% in 2011) and amounted to 224.3 million UAH. In 2012, a share of enterprises' own funds, directed to finance innovation activity, was 63.9% of the total financing and amounted to 7335.9 million UAH; in 2011 it was 52,9% (7585.6 million UAH). Thus, the insufficient financing is the reason of low level of enterprises' innovative activity, and on the other hand, it can be considered as the consequence of low level of Ukraine' innovative development.

According to the specialists' research, 25.6% of the sold industrial products in industry were produced by using low-level technologies, 45.6% - based on medium-low technologies, 21.3% - medium-high technology level and only 6.6% - based on using the high level technologies [11].

To reduce material and energy consumption intensity, to increase the competitiveness of industrial enterprises, implementation of technological innovations is of great importance. In particular, these are innovations aimed to change the production process and technologies. In 2012, the highest expenses for technological innovations were reported by machine-building companies (37.5%), half of which were companies producing building vehicles, trailers and semi-trailers as well as other vehicles; companies producing food, drinks and articles containing tobacco (17.8%), steel-makers and producers of steel products (11.4%), extraction companies and companies exploiting quarries (7.8%). In total, 2188 new technological processes were implemented, 554 of them being technological processes aimed to minimize waste and to save resources (figure 3). Machine-building companies are the most active in implementing such technologies (268 technological processes), food companies rank the second place (74 processes) and chemical industry ranks the third place (57 processes).

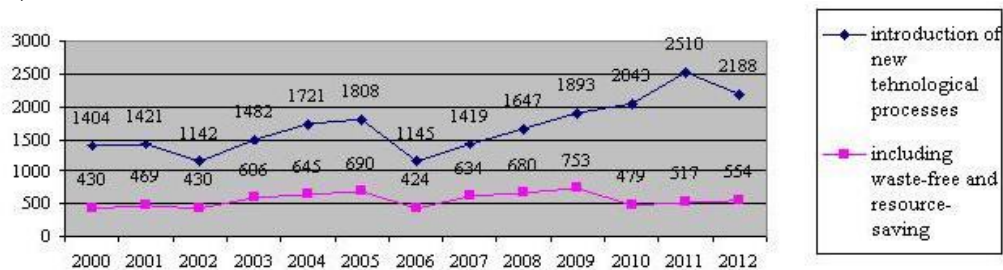


Figure 3. Dynamics of new technological processes implementation at industrial enterprises in Ukraine.

The performed analysis allows concluding that nowadays, despite official assurances about the need to implement an innovative model of development and dozens of normative acts governing innovative activity, Ukraine has not managed to create institutional conditions for dynamic innovative development, including the sphere of the innovation state management. Even the scanty resources that are available normally get diffused, which decreases economic incentives and stifles the work of the best components of scientific, technological, and industrial potential of Ukraine.

Existing state scientific and technical programs in Ukraine have not been provided with the attainment of such final result. The business has not got incentives to implement long-term projects that would ensure basic technological changes. Foreign investments are predominantly targeted to support traditional-for-Ukraine productions that have short-term export prospects.

A characteristic feature of current innovation policy in the Ukraine is the expressed intention to exploit scientific technological innovations for the purpose of economic growth, but, in reality, this policy has not been implemented. One of the reasons is wrong theoretical and practical approach that the transitive economy with a high industrial development can occupy the old industrial niches within the international trade. But only expansion of new modern branches and forming more innovative structure of production will allow to guarantee stable economic growth for Ukraine.

There is no favourable enough environment for innovations in small and middle business, explaining and stimulating instruments of financing, competent managers in innovation development, marketing knowledge and instruments, efficient co-operation of large industry with innovative small and middle business. The necessary infrastructure is absent. The bureaucratic approach blocks innovative methods. The willingness of big industry to co-operate with higher educational establishments, research organizations and private sector is developed not enough that is especially felt in the regions.

Systematization of results of the numerous questioning of businessmen gives possibility to aggregate the problems which restrain innovative activity of small business:

1. Financial problems:
  - lack of the enterprises' own resources;
  - complexity of attracting financial resources from different sources;
  - insufficient support from the state;
  - weak orientation of the financial system to support innovation activity;
  - lack of efficient financial mechanisms for involving small business into innovation activities.
2. Organizational and communication problems:
  - lack of state support to regional programs for scientific, technical and innovation development, focused on establishment of an innovation model for economic development of the regions;
    - lack of efficient organizational mechanisms for involving business into innovation activities;
    - inadequate development of the innovation infrastructure which must give intermediary, informative, legal, expert and financial services;
    - external orientation of intermediary service companies, which are trying to sell results of R&D and inventions to foreign customers only;
    - imperfection of the legal basis for government policy in the research and innovation sector: difficult procedure of conferring the status of innovation project, inefficient state system of the intellectual property rights protection;
      - inefficient promotion mechanisms to applying inventions;
      - low impact of training programs on innovation activity;
      - decline of R&D personnel's quality, including aging, and the decline in qualifications due to the quality of education deterioration in natural sciences and engineering.
3. Informative problems:
  - absence or inaccessibility of the systematized information on new technologies which have potential of commercialization;
  - absence or inaccessibility of information about the state and prognostic estimations of innovative production markets;
    - absence of conditions for co-operation with other subjects of innovative process;
    - very few R&D results from the regional S&T system are used in innovation activity. Patent activity of the state R&D sector is negligible.
4. Inner industrial problems:

- low level of enterprises' innovative potential;
- lack of skilled technical and administrative personnel;
- low level of the technologies market development;
- immaturity of consulting and engineering infrastructure.

5. Markets problems:

- lack of incentives for high-tech SMEs development;
- obsolete industrial structure with high share of mining and ferrous metallurgy sectors, which is not favourable towards innovation activity. Growth of the energy consumption level.
- uncertainty of the innovative process terms, high economic risks of innovative activity;
- protracted recoument period of innovations;
- inadequate internal demand for scientific research;
- high cost of innovations.

Supporting the innovation activities is a main way to overcome the state of stagflation which causes many problems of Ukrainian economy. A set of questions relating to setting up legal and institutional mechanisms for stimulating national investment in technological change must become a priority for the legislative and executive branches of the government.

Actualization of the "knowledge factor" as a solution of the general problems of economic growth is very important. Efficient innovation policy should provide an efficient mechanism of investing into crucial structural changes for the benefit of the fifth technological paradigm production, the key technologic factor of which is the information technologies.

In order to make innovation more efficient, it must be manageable. At present, Ukraine does not have a full-scale multi-level governance of innovative development, which leads to an uncertainty of national innovation policy. Priority measures on forming the management system of innovation development in Ukraine are: formation and maintenance of the Coordinating Council for innovative development under the Ministry of Economic Development and Trade; working out subprograms for innovative development at the level of the regions, towns and industries; performing the financial support of innovative projects on a competitive basis; implementation of annual monitoring and analysis of medium-term innovation priorities.

Increasing the innovative activity of existing industrial enterprises is one of the key aspects of innovation policy, as innovation provides competitive advantages to business entities. The main difficulties in implementing the innovative capacity of enterprises are related to the limited budget and extra budgetary funding, including borrowed and involved funds, as well as lack of own funds of organizations. However, the deficit is not a single factor declining innovation. Innovation infrastructure requires attention and improvement (advisory services, risks insurance, venture capital funds, etc.).

Increasing innovative activity at existing industrial enterprises should be implemented through the following objectives: creation of a full-fledged innovation infrastructure; real financial support; economic interest of enterprises in innovative activities. One of the most important tasks of the innovation policy implementation is to raise the efficiency of scientific research and their use in high technology manufacture to create products and services. Support for research, developments, institutions of science and research workers in scientific and technical sphere should be implemented through the following objectives: creation and implementation of measures to strengthen institutions in developing innovative products and services; mobilization and motivation of employees in scientific and technical fields to actively participate in preparation and implementation of innovative projects and programs; ensuring the process of developing skills for efficient work in the innovation economy of undergraduate and graduate students of universities functioning in Ukraine; creation and support of a database on research and development; assistance in internships for young scientists in foreign research centres, as well as national scientific centres of Ukraine; strengthening technological and innovation orientation of the fundamental and exploratory research; establishing a system of support services to small and medium-sized companies lacking their own research base through provision of information services and organizing vocational retraining.

**Conclusion.** Increasing intensity of innovative processes will give impetus to development of science intensive industries by increasing rate of new technologies implementation that provide a high level of resource and energy efficiency at enterprises and other business entities. All this together provides for a sustainable competitiveness of the national economy in Ukraine and foreign markets for goods and services, as well as achieving a high standard of living for the population.

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**Iryna Bryzhan**, Doctor of Economics, Docent, Professor of department of enterprise economics and personnel management. Poltava National Technical Yuriy Kondratyuk University. **Innovation development of Ukraine: current state, problems and ways of their solving.** The author analyzed the main indicators of the level of innovative development of Ukraine. The key problems that hinder the development of innovative activity of industrial enterprises in Ukraine are identified and grouped into five groups: financial, organizational-communication, informative, inner industrial and market. The most effective measures to improve innovative activity of industrial enterprises are proposed.

**Kew words:** innovation, investment activity, innovation activity, innovation development, industrial enterprises.

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**Ірина Анатоліївна Брижань**, доктор економічних наук, доцент, професор кафедри економіки підприємства та управління персоналом. Полтавський національний технічний університет ім. Ю. Кондратюка. **Інноваційний розвиток України: сучасний стан, проблеми та шляхи їх вирішення.** Проведено аналіз основних показників, що характеризують рівень інноваційного розвитку України. Визначено основні проблеми, що стримують розвиток інноваційної активності промислових підприємств України та згруповано їх в 5 груп: фінансові, організаційно-комунікативні, інформативні, внутрішньо-виробничі та ринкові. Запропоновано найбільш ефективні заходи щодо підвищення інноваційної активності промислових підприємств.

**Ключові слова:** інновації, інвестиційна діяльність, інноваційна діяльність, інноваційний розвиток, промислові підприємства.

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**Ключевые слова:** инновации, инвестиционная деятельность, инновационная деятельность, инновационное развитие промышленных предприятий.