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## ECOLOGICAL INNOVATIONS IN UKRAINE

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**Opportunities of introducing ecological innovations in Ukraine directed at development, creation and implementation of innovations in the form of new products, technology, methods, and forms of production organization are analyzed. It is proved that such innovations implementation will help, directly or indirectly, reduce the eco-destructive effect of manufacturing and consumption on the environment as well as solve ecological problems.**

**Key words: innovations, innovative products, innovation technologies, ecological innovations, ecological management, ecological auditing, ecologization.**

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## ЕКОЛОГІЧНІ ІННОВАЦІЇ В УКРАЇНІ

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**Проаналізовано можливості реалізації екологічних інновацій в Україні, спрямованих на розроблення, створення і впровадження інновацій у вигляді нової продукції, технології, методів та форм організації виробництва, що прямо чи опосередковано сприятиме зниженню екодеструктивного впливу виробництва та споживання на навколишнє середовище та допоможе вирішенню екологічних проблем.**

**Ключові слова: інновації, інноваційна продукція, інноваційні технології, екологічні інновації, екологічного менеджменту, екологічного аудиту, екологізації.**

### Problem statement

Innovation processes on the level of region and country in the conditions of modern market model characterized by: intellectualization of manufacturing activity, usage of high technologies (IT, nano-, bio-, space, genetic, robotics, microelectronics etc.), development of manufacturing and consuming ecologization, improving living standards etc. Modern scales of ecological changes in Ukraine create real danger for population's life and health. Environment degradation because of hypertrophied development processes in material manufacturing and extensive usage of resources reached dangerous boundaries. Nowadays in Ukraine speed of increase intensive parameters impact on environment came out from speed boundaries of the living organism biological adaption to the habitat. Environment destabilization in the major of Ukraine regions has direct connect with health deterioration of population, and if now won't take innovation measures to improve environmental conditions, in future can be observed deficit of grocery resources, water, oxygen, and genetic degradation speed up population degradation, gradual their extinction.

### Analysis of recent research and publications

Studying of innovation processes in economy engaged B.M. Danylyshin, S.I. Doroguntsov, V.S. Mishchenko, L.M. Ganushchak, V.A. Verba, A.V. Grechan, V.P. Melnyk, P.P. Mykytyuk etc. Significant contribution in research of development ecological orientation of industrial enterprises innovation activity belongs to the school at Sumy National University, namely L.G. Melnyk, S.N. Illiashenko, V.V. Bozkova, O.V. Prokopenko etc.

Over the development of the problem associated with ecological innovations work I.O. Aleksandrov, L.S. Gryniv, M.I. Bubyk, T.O. Koropetska etc. Most developments have applied orientation.

Scientists emphasize that innovations, including ecological, contribute intensification competitiveness of companies, whereas is observed strong connection between market activity and new ecological products. Production and technological innovations help to capture and keep the part of market, increase profitability on these markets.

### **Objectives**

Exploring this problem, first of all we must clearly define with the definition “innovations” and “ecological innovations”. Analyze possibilities of introduction ecological technologies in Ukraine, which directed on working, creation and plantation innovations in the form of new production, technology, method, organization manufacturing, what directly or indirectly will promote on reduction of eco-destructive manufacturing and consumption impacts on environment and solution of ecological problems.

### **Materials**

In our opinion, the most successful approach is proposed by B. Santo: innovation – is such social, technological or economic process, through which practical usage of ideas and inventions leads to the creation of the best product in its properties, technologies, if they can bring on the market additional income. In this term, innovation products – are products that have undergone significant changes (its technical characteristics and sphere of usage vary considerably from technical characteristics and spheres of usage production, which were manufactured before), or newly introduced (fundamentally new) production [1].

Ecological innovation – is the result of creative activity, which directed on working, creation and plantation innovations in the form of new production, technology, method, organization manufacturing, what directly or indirectly will promote on reduction of eco-destructive manufacturing and consumption impacts on environment and solution of ecological problems. According to this definition, to ecological innovations include [3, p. 69]:

- development, creation and implementation of new technological processes, technological cycles of development and coordinated evolution of all functional chains from the extraction of resources, their recycling, usage of waste and reproduction of these resources;
- development and application of saving resource equipment, development and plantation of low-waste, non-waste technologies, including saving energy, evolution technologies, which provide comprehensive reclaiming of natural resources, development of bio-technologies;
- reclaiming of new territory, and also expansion of active one, considering ecological safety of population and manufacturing;
- development and outturn of new clean ecological products and creation capacity for their production, development variants of usage new and renewable energy sources;
- plantation of new organization forms, including improvement of organizational and territorial structure of potentially dangerous industries with the aim to reduce their ecological menace;
- formation of new thinking in innovations developers in a point of view of necessity its ecologization by the way of plantation mandatory ecological education.

Each of this mentioned elements have its specific features and signs, from which depend character of ecologization innovation, separately: potential signs of innovation characterize their ability to prevent a negative impact on environment, to liquidate this negative impact, caused in the environment; fictional characteristics – special properties, which acquired the system by pre-defined parameters, such as ecology, safety, low level of ecological risk, – are provided by improving of organizational management structure with the innovation processes through their direction in new ecological economical direction.

Ecological technologies around the world are industry, which is growing faster. Becoming the most important economical factor, ecological technologies appears in the task of innovation development in industrial scales. The main markets of ecological innovation products are: production and accumulation of the energy; saving energy; economical usage of raw materials; ecological transport; rational usage of water resources, bio plastics and polymers; solar cooling.

Nowadays segment of the global market for ecological technologies is around 1,000 billion euros a year, being already as an important development factor in the global economy. Technology solutions in

energy saving industry occupy 45 % of this segment. Economic growth of this segment of the market for ecological technologies is about 5.4 % per year and according to the points of experts to 2020 will be equal 2,200 billion per year [2]. The most promising can be named such technology direction as: solar power station, solar cooling, membrane technologies in the water industry, bio plastics and polymers, decentralized water supply, synthetic biofuels etc.

New model of economic growth based on innovation type of development, provides change the term of scientific technical progress and scientific technological development. Appear new priorities: welfare, intellectualization of production activity, usage of high information technology, ecology. This model requires new financial monetary policy, effectively stimulating innovations, developing of science roomy and reduce nature exploitation industries – at the macro level; changes in the type of business activity, active involvement in the production of small and medium private businesses – at the micro level.

Unfortunately in Ukraine there are contradictions in the sphere of innovation development, which is on the one hand, we have quite a high innovation potential, and the other – the economic structure and the management mechanism were turned out unable to use the potential.

Thus since 1991 the typical annual budget expenditure figure for science was 0,3 – 0,5 % of GDP and total – from all of source – (0,8 – 1,2) %, at a rate of at least 1,7 % of GDP. This led to an outflow from Ukraine qualified scientific and technical personnel, decline of many scientific schools, rapid degradation of the material, technical base of scientific, scientific and technical researches. Volumes of practical realization of ecological developments are: environmental protection – 6,7 %; population health – 16 %; production, processing and storage of agricultural products – 3 %; ecologically clean energy and saving resource technology – 4,3 % ; new substances and materials – 8 %; advanced information technology, integrated automation equipment, communication system – 5 %; scientific problems of the state development – 13 % [3]. Less than 1 % registered in Ukraine objects of intellectual property are realized in practice, while for example in Finland – 30 %. [4]. Development problem of innovation ecological sphere cannot be led down only to condition and productivity of science. The real obstacle on the way of national innovation economy development is the problem of entrepreneurship, low levels of local businesses entrepreneurial activity, especially in complex, knowledge-intensive types of business. Just entrepreneurs are the main subjects of innovation activity. They are executors, who take all the risks and difficulties of practical implementation innovations. Without the active mass of business, government agencies, legal, financial and commercial institutions don't form economic independently. Today among entrepreneurs is spreading copying strategy. However, access to the world market of these products is possible only by the price competition, which has recently is losing its effectiveness. World experience of companies, which successfully are developing, shows that nowadays survives one who is constantly engaged in innovation.

The problem is that innovations require considerable costs. Some enterprise is mainly engaged financing of applied programs that focused on creation of improving innovations. Creation of a basic innovations, fundamentally new product – is very laborious process that requires considerable financial resources and time-consuming (according to international experience, from 3 to 7 years). Therefore, there is no interest for private investors, who are focused on immediate returns.

For the solution of these questions needed dialogue of science, business and government, needed consolidate of the efforts [5]. These efforts can be consolidated through the establishment of ecological management and ecological auditing.

Ecological management and ecological auditing as forms of environment protection activity exist in the world for over 20 years. They proved to be very effective compared with traditional methods of governmental control, management and is widely used in developed countries.

In Ukraine, we can only talk about existence of need in usage such forms of industrial ecological culture as ecological management and auditing. Such need is determined by:

- expressed declarative character of governmental ecological control;
- deterioration of ecological condition, which is related with the lack of targeted ecological policies on enterprises;
- inefficient usage of business opportunities in solving their own ecological problems.

Active ecological legislation of Ukraine provides only administrative, control methods as basic to the special authorized governmental agencies for the management in realm of environmental protection.

Namely, accent concerns on the control function, as one that would ensure compliance with ecological culture of enterprises. Nowadays, appears a situation when only regulatory actions are not enough. For businesses that don't work or work intermittently, control measures are ineffective, because such enterprises practically don't cause environmental damage. For businesses that are constantly leading production activity, all ecological policy is to obtain a particular permission, or (quite rarely) pay a fine for failure the norms of ecological legislation. In this case, on condition of lack of available working capital, for the business management the major task is to avoid in any way conflicts with controlling authorities.

As a result, there is a situation where entrepreneurs are focused on evasion from a particular ecological penalty and in a result, continue polluting the environment, don't implement its own ecological policy. In addition, many of the problems associated with pollution of environment do not require from entrepreneurs' large financial costs to solve them, and sometimes contribute to obtain pecuniary advantage. However, for the majority of Ukrainian businessmen production ecologization and plantation forms of industrial ecological culture on controlled enterprises aren't priority.

Solution outlined circle of problems primarily due to the development of new approaches of implementing industrial ecological forms of culture. At a national level. It is necessary to shift from control, regulatory incentives to stimulative, legislative methods of production ecologization. It is necessary to develop a mechanism to stimulate entrepreneurs, who implement their own ecological programs, and to ensure realization of targeted ecological policy by foreign investors as a condition for receiving their taxation and other benefits. The last is especially important in now, when Ukraine is working towards to increase investments in its own economy. Herewith, of course, shouldn't refuse and from control methods, which, however, can contribute more corrective character.

At the sectorial level. Today the companies from a number of industries don't produce goods or produce it in small quantities, in addition, the volume of production in others (for example, for various kinds of recycling enterprises) increases and, simultaneously, increasing emissions and pollution caused by them. Therefore, it is reasonable to implement of intra-sectional target ecological programs that could complement legal methods. It should also be noted the importance of functioning specialized enterprises for recycling of secondary raw materials (such as, non-ferrous metal waste, slag processing from power station, etc.). Extension and support such kind of secondary recycling enterprises can significantly reduce the impact of damage to the environment by direct production processes.

At the enterprise level. Of the two most common forms of industrial ecological culture of real application could acquire ecological management. External ecological auditing requires significant direct material costs and is unlikely to be affordable for most enterprises. It can be replaced with an internal analysis that allows anyway identifying the main ecological problems of the company. Implementation of ecological management on enterprises must necessarily conform to the principles of eco-effectiveness and eco-justice.

Eco-effectiveness in conditions of an economy transition period can be achieved through:

- combining the functions of quality management and ecological management, what will provide additional opportunities increasing of product quality and achieve a certain level of international standards (for example, ISO);
- to achieve highest degree usage of resources in production processes;
- usage possibilities of advertising ecologically clean manufacturing ;
- reduction of costs associated with ecological fines and receiving economic incentives in different forms of benefits (for entrepreneurs', for example, reducing taxes).
- Eco-justice means:
- formation of voluntary commitments with “ecological openness” of the enterprise;
- support for local ecological programs ;
- informing the general population about the ecological aspects of the business activity;

All decisions taken on described three levels shouldn't conflict with each other and make a unique whole. This approach will ensure the effective functioning, dynamic development of entrepreneurship, and hope that exactly enterprise plays an important role in saving environment.

The economic development of Ukraine at modern stage should consist in transition from making separate, and even the integrated environment protection measures, to develop and implement a comprehensive ecologization concept of social production and other spheres of activity.

Achieving this important goal isn't possible without innovation ecologization and investment activity, creating government stimulation system of saving resource, developments of environmental protecting, and bringing them into conformity with the strategy requirements of sustainable development and ecological security. Usage of ecological innovations will help to reduce resources capacity of industrial manufacturing production and rational usage of natural resources, which are involved in commercial production turnover (land and water resources, mineral resources etc.) and reduce emissions of harmful substance into the air [1, p. 372].

Basis of certain growth of domestic production in recent years were and remain low-technological raw-mining and recycling economic models, which characterized by extremely high levels of resources and energy expenditures. In the condition of world prices rapid increase on energy such economy is guaranteed involve to the losses [2, p. 20]. Intensity of innovation processes in modern world considerably exacerbated ecological problems.

Anthropogenic pressures on the environment from a number of areas are close to the critical point, beyond which inevitably disrupted normal circle turnover substances in the nature. Meanwhile, only on the innovative way is possible to harmonize relationship between population and nature. Scientific, technological advances allow reducing usage of non-renewable resources and emissions due to the rationalization structure of production, consumption, and distribution re-cycling technologies. These issues are particularly relevant in a point of adoption the international community the concept of sustainable development in the XXI century, which provides a stable ecological balance.

The main directions of the implementation ecological innovation of industry are [4]:

- orientation on the causal character of actions, which involves overcoming during the implementation of innovation processes reasons rather than consequences;
- division of responsibilities, which determines targeting and responsibility level of subjects eco-distractive actions;
- formation motivational tools by adequate existing socio-economic conditions;
- maximizing efficiency, which involves achieving goal of ecologization with minimal expenditures and receiving maximal returns from investment funds.

For efficient use of available scientific and industrial potential, development of eco-innovational activity it is necessary to create appropriate conditions, among which can be identifying such as [5, p. 85]:

- creation a favorable climate to stimulate eco- innovation and investment processes;
- establishing efficient mechanism to attract domestic and foreign investments for ecologization innovation activity, investment insurance, protecting rights of investors;
- priority development of energy, resource saving , ecological safety technologies ;
- combination of industrial and financial assets, integrated scientific and industrial structures, that will ensure the development of basic industries, technologies etc.;
- provide tax, credit, depreciation stimulation of domestic enterprises and institutions, that implement new ecological, technological processes and export science-intensive products;
- development of infrastructure innovation activity (technological parks, technological polis, innovative stock exchanges, consulting centers, certification companies, which engaged scientific, technological and innovation activities);
- improving the mechanism of state order for reclaiming priority scientific, technological developments, technologies that are able to make significant changes in increasing the level of ecological manufacturing competitive products;
- ensuring formation on a competitive basis and financing of governmental scientific, technological programs from priority development areas of science and technology.

### **Conclusions**

Thus, ecological innovations are complex processes, which serve as a multifactorial structure, that characterized by the relationships and interdependencies between its individual components, which, in its turn, can be of natural-resource and ecological characters. For implementation the plans of plantation

ecological innovations in Ukraine is requires financial support. Solution the problem of financial support innovation activity relies on the state, which must operate in two directions: provide direct budget support and create effective system of incentives for private investment in scientific-technological sphere. Direct government support should concentrate on basic ecological innovations, at the most competitive world-class technologies, which have a high market potential, and also on those, which are necessary for state security. It provides government funding of governmental directed programs from priority areas of science, technological development and implementation of governmental procurement on scientific-technical products. Stimulation provides granting of certain benefits, such as: income tax liabilities delay from the profit in part of expenditure on innovation targets; reducing the tax on accretion innovation expenditures; 'tax holidays' for several years on profit, received from the realization of innovative projects etc.

### **Prospects for further research**

Previous researches indicate that the demand on ecological products, which have innovative character, all around the world (Ukraine isn't an exception) is frequently growing. Thus, the potential of the national economy on the development and implementation in manufacturing and consumption of ecological innovations practically isn't realized. Namely, production and promotion on the market of ecologically clean products could be one of the most promising areas of realization of the existing competitive strengths in Ukraine's economy. Considering this complex, is set complex of priorities on the formation of implementation mechanism of ecological innovation on the approaches base to marketing innovations and ecological marketing, which became prospects for further researches.

*1. Бубенко. П., Гусєв В. Чому гальмуються інноваційні процеси в Україні? // Економіка України. – 2009. – № 6. – С. 30–39. 2. Гринів Л.С. Екологічно збалансована економіка: проблеми теорії. – Л.: ЛНУ, 2001. – 215 с. 3. Лайко П.А. Удосконалення інноваційної діяльності в АПК – вимоги часу // Економіка АПК. – 2007. – № 12. – С. 85 4. Лапко О. Екологічний фактор в інноваційній діяльності // Економіка України. – 1998. – № 8. – С. 69. 5. Черничук Л.В. Особливості державної інноваційної політики в розвинених економічних системах / Л.В. Черничук // Вісник НУВГП. Економіка. Ч. 2. – 2006. – № 4(36). – С. 372.*