

**THEORETICAL ASPECTS OF INNOVATION IN
ENVIRONMENTAL SCIENCES
ТЕОРЕТИЧЕСКИЕ АСПЕКТЫ ИННОВАЦИЙ В
НАУКАХ ОБ ОКРУЖАЮЩЕЙ СРЕДЕ**

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Abstract. The innovation process is a set of scientific, technical, technological and organizational changes occurring in the process of creating and implementing innovations, while the criterion characteristic of the innovation process is the introduction of an innovation in quality of obtaining the final result, implemented in production.

Key words: innovation, ecological development, sustainable development, technology, environment, waste.

Аннотация. Инновационный процесс - это совокупность научных, технических, технологических и организационных изменений, происходящих в процессе создания и внедрения инноваций, при этом критерийной характеристикой инновационного процесса является внедрение инновации по качеству получения конечного результата, внедряемого в производство.

Ключевые слова: инновации, экологическое развитие, устойчивое развитие, технологии, окружающая среда, отходы.

The experience of countries with developed market economies shows that innovations have recently become the basis for increasing the competitiveness of

these countries, as well as a basic element of their social structure. According to estimates, the share of the innovation and information sector has increased many times over in recent years and amounts to 45–65% in developed countries.

Innovations have become the driving force of economic, social and environmental development of the countries of the world.

The concept of "ecological innovation" appeared in the second half of the 20s. As defined in the European Union Green Technology Action Plan, green innovation is the production, deployment or use of innovations in products, processes, services or management and business practices that reduce negative environmental impacts and are sustainable throughout their life cycle. Researchers and practitioners view innovation as the result of long-term projects that include research and testing phases. Technological innovations in the field of ecology are of great importance for business organizations. Unfortunately, statistics show that only a few environmental innovations are successfully implemented and commercialized. It encourages researchers and practitioners for further active work in this direction. The topic of innovation in modern science is reflected in the field of environmental management, resource conservation and treatment facilities. There are many terms synonymous with the concept of "ecological innovation" in various foreign sources: eco-innovation, "clean" technologies, "green" technologies. All these terms include a wide range of innovations united by one common feature: their application should simultaneously generate positive economic and environmental effects. Environmental technologies include: energy efficiency improvement, optimization of waste processing, renewable energy, green construction, ecological transportation, resource and waste management, and developments in materials processing; environmentally friendly construction methods and building materials (environmental development, including the creation of specialized machinery, the formation of the market for environmentally friendly

products and ecological services); alternative transport and environmental management.

The goal of eco-innovation is to stimulate various innovations aimed at reducing the anthropogenic impact on the environment, as well as improving the life of society as a whole. All current environmental measures normalize the ratio of production forces and production relations to the resource component in the economy through the introduction of innovative technologies.

Based on this goal, the following tasks of ecological innovations in the modern economy can be formulated:

Promoting sustainable economic growth by introducing "green economy"; saving natural resources and directing the saved funds to the needs of society; introduction of high-tech environmental innovations to improve production processes; Improve the efficiency of environmental management; achieving the level of economic profitability of alternative energy technologies.

From all of the above, we can conclude that environmental innovation is a very broad concept that affects many areas of economic activity. Despite the novelty of this concept, there are many variations of the term "eco-innovation".

As an example, consider the classification of the concept of "ecological innovation" developed by researchers from Maastricht University.

Arundel and R. Kemp give several possible classifications of environmental innovations in their work. The first classification is based on the purpose of introducing new technologies. According to this classification, eco-innovations are divided into four groups:

- 1) technologies aimed at environmental protection;
- 2) organizational innovations for the environment;
- 3) innovative products and services, the use of which will benefit the environment;
- 4) ecosystem innovation.

The first group includes eco-innovations such as pollution control technologies, including water treatment technologies; technologies that allow to eliminate the negative effects of environmental pollution; technologies introduced into production, for example, new production processes that help reduce environmental pollution, use production resources most efficiently; technologies and equipment that optimize the waste disposal process; technologies and tools for environmental monitoring; energy saving technologies; water availability monitoring technologies; noise control technologies.

According to this classification, the second group of ecological innovations includes: measures to prevent environmental pollution; environmental audit: a management system that includes measuring, reporting, and monitoring issues related to the use of resources, energy, water, and waste, for example, creating control chains: reducing negative environmental impacts and improving overall productivity interaction of organizations to prevent environmental damage along the supply chain.

The third group of eco-innovations includes: new or ecologically improved products, for example, ECO houses and buildings; "green" financial products; environmental services: solid and hazardous waste and wastewater management, environmental consulting, testing and design; services aimed at reducing environmental pollution and optimal use of resources.

In the fourth group, the authors include alternative production methods and consumption habits that are more environmentally friendly than the existing systems: biological agriculture and renewable energy sources.

If we classify environmental innovations according to broader criteria, we can distinguish the following subgroups, for example: by the period of implementation, permissibility of use, economic characteristics, scope of application, sources of origin, type of innovation; in terms of efficiency and utilization. Let's take a closer look at each element of this classification.

Long-term eco-innovations pay for themselves in no less than 10 years and are primarily financed based on state goals.

Medium-term eco-innovations bear fruit within 3-10 years and are mainly implemented by large and medium-sized enterprises.

Short-term eco-innovations - pay for themselves within 3 years and are implemented by small enterprises.

Desired eco-innovations are the latest processing technologies that are absolutely harmless to people and nature.

Acceptable eco-innovation - in the processing of waste, the environment and people are less harmed.

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