Chapter 29
Environmental Hazards of Nanotechnologies and Measures of Economic and Legal Incentives to Reduce Them in Russia and the EAEU Countries

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Abstract This chapter argues for the conclusion that at the moment all the regulatory regulation of the environmental and sanitary hazards of nanotechnology in Russia is enshrined in by-laws, which are often only advisory. Therefore, it is extremely important that the Federal Law "On Environmental Protection" of 10.01.2002, as well as the Federal Law "On Sanitary and Epidemiological Welfare of the Population" of 30.03.1999, be supplemented with special articles. These articles should contain the minimum necessary amount of protective measures against real or potential threats to human health and the environment associated with the mass use of nanotechnology and nanoproducts. These articles should contain measures for mandatory labeling of nanoproducts. According to the state registration of nanoproducts of medium and high danger. For carrying out its sanitary-epidemiological and other examinations, depending on the degree of potential environmental danger of such products. To fix the obligation to research the expense of the federal budget on the presence of environmental consequences of nanotechnologies and nanoproducts for the environment and human health, which should result in changes to the existing system of environmental standards and technical regulations. To develop new methods of environmental and sanitary supervision and new types of offenses related to noncompliance with the above-mentioned sanitary and environmental measures. An alternative solution could be the adoption of a separate federal law dedicated to the development of nanotechnologies and the turnover of products obtained with their use. The law should contain a special section (chapter) on guarantees of the rights of citizens from their dangerous consequences. In addition, this chapter explains the need for a set of measures in the field of environmental education and education, as well as strengthening international cooperation. Including the adoption of some international documents regulating the creation of an international information resource containing the results of scientific research on the negative impact of nanotechnology and nanoproducts on the environment. This will allow for more rational use of the

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scientific, technical, intellectual, and another potential of the leading countries of the world and will allow them to quickly exchange information about the results of such research.

Keywords Nanotechnologies · Nanoindustry · Environmental hazards · Sanitary legislation · Legal regulation · Natural resources

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29.1 Introduction

Nanotechnology refers to methods for producing and using substances and materials in the size range from 1 to 100 nm (nano-meter—one billionth of a meter) with specified properties and characteristics. In this size range, materials tend to exhibit different properties than at the normal scale, including greater activity and reactivity. The use of these unique properties determines the interest of the state and business in the development of new products, processes, and technologies. This gives rise to a new phenomenon—the nano industry, i.e., an intersectoral complex of organizations that provide and carry out targeted activities for the development and commercialization of nanotechnology (Matytsin and Rusakova, 2021). Developments in the field of nanotechnology have the potential to provide huge social benefits, including improvements in the diagnosis and treatment of diseases, the production of clean energy. As well as improving the efficiency of computers and electronic equipment, the production of stronger and lighter composite materials. Unfortunately, the same properties that account for many of the potential benefits of nanomaterials (especially their small size and dynamic properties) also pose risks to human health and the environment. Because nanomaterials can penetrate biological systems and react with them.

Current scientific evidence on these risks is mixed at best. Some studies of the effects of nanomaterials on experimental animals have caused toxic reactions in them. However, other studies have shown no negative consequences, which indicates that the risks of nanoproducts for human health are insignificant. Currently, there is no methodology for predicting which nanomaterials will cause a toxic reaction and which will not. Moreover, each specific nanomaterial can present significant risk variations. Extremely vague and insufficiently proven information about the side effects of nanotechnologies paralyze the activities of state management bodies in the absence of effective sanitary and environmental legislation.

At the moment, nanotechnology has not yet become widespread in Russia. At the same time, firstly, the products obtained with their use are imported to Russia from other countries. This raises the question of managing these processes and guaranteeing human health and environmental safety (Abanina et al., 2020). Secondly, the development of scientific and technological progress is inevitable, and the process of production of such products directly in Russia will sooner or later be established.

Therefore, Russian citizens and authorities will have to face the same problems that already exist in more technologically advanced countries. This should be prepared using the accumulated experience of both other countries and the Russian Federation.

29.2 Materials and Methods

The legislative base of the study was made up of Russian federal laws. Including "On the sanitary and epidemiological welfare of the population", "On Environmental Protection", "On self-regulating organizations'. As well as by-laws adopted in Russia that regulate certain guarantees of the right to health of citizens and the preservation of favorable environmental quality when using nanotechnology (GOST 54336-2011 "National Standard of the Russian Federation"). Environmental management systems in organizations that produce nanoproducts. Requirements "Methodological guidelines of MU 1.2.2636-10.1.2 "Hygiene, toxicology, sanitation. Conducting sanitary and epidemiological expertise of products obtained with the use of nanotechnologies and nanomaterials", Resolution of the Chief Sanitary Doctor of the Russian Federation of 23.07.2007 "On supervision of products obtained with the use of nanotechnologies and containing nanomaterials". Some supranational acts were also considered, including the Decision of the Customs Union Commission of 09.12.2011 "On the adoption of the Technical Regulations of the Customs Union "On Food Safety".

The purpose of this chapter was to study not only Russian legislation, but also the EEU countries (Armenia, Belarus, Kyrgyzstan, and Kazakhstan). The chapter reviewed the regulations of these countries, including the following. Fundamentals of the legislation of the Republic of Armenia "On Nature Protection" of June 9, 1991. The Law of the Republic of Armenia "On ensuring sanitary and Epidemiological safety of the population of the Republic of Armenia" of December 12, 1992, the Law of the Republic of Belarus "On Environmental Protection". Law of the Republic of Belarus "On Sanitary and epidemiological welfare of the population" of January 7, 2012, Law of the Kyrgyz Republic "On Environmental Protection" of June 16, 1999, Law of the Kyrgyz Republic "On Public Health" of July 24, 2009, Environmental Code of the Republic of Kazakhstan of January 9, 2007, Code of the Republic of Kazakhstan "On Public Health and the Health System" of July 7, 2020.

However, these regulations contain only fragmentary references to the guarantees of the right of citizens to health and a favorable environment when using nanotechnology. The chapter widely used the provisions of the scientific doctrine, including the work of Belokrylova (2014), Dana (2010), Dennis (2006), Goldstein (2010), Heselhaus (2010), Kaddour (2013), Lerer (2013), Marchant et al. (2010), Paddock (2010), Perez (2010), Petersen and Bowman (2012), Stokes (2012), Theodore and Stander (2013), Wilson (2013), Inshakova et al. (2018, 2020) and Matytsin and Rusakova (2021).

In the process of research, general scientific methods are used, such as formal-logical, dialectical, system-structural, critical cognition. Methods of synthesis, classification, and generalization were used to interpret the results of the study. The

paper also uses private scientific methods: formal-legal, the principle of assessing legal processes, the method of comparative analysis, etc.

29.3 Results

29.3.1 Scope of Application of Nanotechnologies and Their Potential Danger to the Environment and Human Health

At the moment, in the scientific literature, along with the study of positive commercial and other prospects from the use of nanotechnology, attention is beginning to turn to the high probability of various negative social consequences from their use.

There is no doubt that the negative impact of nanotechnology on human health and nature must be identified before products using it enters the market. Prudent deployment of nanotechnology can have a positive impact on the environment if used as intended. The state needs to determine the most profitable way to include nanotechnology in environmental laws and regulations (Dennis, 2006). The problem is that the possible biological effects of nanomaterials entering the human body have not yet been sufficiently studied. Although there is already evidence that various substances, when converted into the form of nanoparticles, can significantly change their physical and chemical properties, which can negatively affect human health in the process of their assimilation into the body. For example, recent studies have shown that carbon nanotubes have the same carcinogenic effects as asbestos (Heselhaus, 2010). Fullerenes, tiny carbon structures that resemble soccer balls, have been found to cause brain damage in aquatic animals. Quantum pillboxes, which focus on targeted drug delivery, also pose a toxicological risk to human health and the environment. However, while carbon nanotubes may increase the risk of mesothelioma, other carbon particles of similar size do not pose a similar risk (Lerer, 2013).

The consequences of nanoparticles reacting with other substances, as well as the environmental consequences of such a combined effect, remain unexplored. Of particular concern to biologists is the impact of nanoparticles on the state of wildlife objects-animals, plants, and insects. There is a risk of the indirect impact of nanotechnologies and nanomaterials on the environment and human health. The risk lies, for example, in the effects of exposure to nano pesticides and nano agrochemicals on plants and domestic animals, as well as the person who consumes the corresponding products. The issue of the methodology for conducting ecological and hygienic studies to assess the environmental impact of waste from the production of nanomaterials, the problems of their storage, disposal, and destruction remains unexplored. There is also a threat from nanotechnology because of the potential to create incredibly destructive weapons. Such nanotechnology weapons can be more

powerful than any known chemical, biological, or nuclear agent can. It will be difficult to detect, and this may lead to a new round of the arms race (Wilson, 2013).

At the same time, the environmental consequences of the use of nanotechnology cannot be considered only in a negative, negative sense. A number of scientists believe that nanotechnology can help restore a favorable quality of the environment. So, thanks to nanotechnology, solar panels are currently being exploited, which means that mass burning of coal and petroleum products is no longer possible. As well as the disappearance of the danger of the greenhouse effect and the death of the ozone layer, the consequences of oil spills and emissions of oil refining waste, air pollution by combustion products. Nanotechnology can also be an important part of cleaning up contaminated and hazardous waste. Nanotechnology can also contribute to reducing the environmental risk of toxic emissions and discharges containing arsenic, mercury, cadmium, and lead compounds. It can be achieved by developing and implementing mechanisms that convert the chemical composition of these emissions into non-toxic substances and elements. Finally, nanotechnology can be used to create more powerful sensors that can accurately detect pollutants in the environment at very low concentrations. In medicine, nanotechnology can be used for the diagnosis of diseases, in the manufacture of medicines. In the food industry—in the production of biologically active food additives and new forms of packaging that have an antimicrobial effect (or that will be gas-or moisture-proof). As well as in the production of clothing and many other areas.

These materials can eventually be used to strengthen fibers (nanowires), which will increase the safety of fabrics, including priming. Nanomaterials are used in many cosmetics to transport nutrients and other substances through the skin. This allows the body to absorb even substances that are insoluble in water. Composite materials that use nanoparticles resist heat better. They have better conductivity and exhibit a higher strength-to-weight ratio. Nanoparticles are also used for coatings that prevent the product from scratching (nanoscale ceramic particles). They exhibit antimicrobial properties in appliances that decompose organic material to make windows and roofs self-cleaning.

The military also shows interest in nanotechnology, including in such areas as optical systems, nanorobots, nanomachines, “smart” weapons, nanoelectronics, virtual reality, sensors and surveillance systems. As well as special materials for armor, nanomaterials for stopping bullets and bio-nano-devices for detecting and destroying chemical and biological agents. Much of this interest is related to protecting against attacks and minimizing the risk of military personnel (Theodore and Stander, 2013).

Despite active discussions about the negative impact of nanotechnologies and nanoproducts on the human body and its environment, there is no proper legal assessment of these consequences in both Russian and international and foreign law. It makes it difficult to protect the health of citizens and the environment from the potentially dangerous effects of nanoparticles.

29.3.2 Problems of Accounting for and Countering Threats from Nanotechnology for the Protection of the Environment and Human Health

The wide range of possibilities for using nanotechnology creates significant management problems. Since different applications of nanomaterials are regulated not within the framework of a single legal regime, such as the handling of hazardous waste, but through a wide range of regulatory rules. The fact is that no country in the world has a single regulatory framework that would cover food, chemicals, personal hygiene products, medical devices, water quality, and so on.

At the same time, in addition to the objective difficulties with managing the processes of production and turnover of nanotechnologies and nanoproducts, there is also an important subjective factor. It is associated with a lack of public knowledge and awareness in the field of nanotechnology. The population of not only Russia but also other EAEU countries is poorly informed about the benefits and possible side effects of nanotechnology. This hinders the development of this industry, and the lack of a clear management system creates a risk of public rejection of nanotechnology (Paddock, 2010). However, when planning to involve the public widely in the process of discussing the importance and possible side effects of nanotechnology, it is necessary to know the answers to the question of who is involved and for what purpose the organizers of this process plan to involve.

The fact is that the term "public participation", although currently widely used in many contexts, has many meanings and applications in practice (Petersen & Bowman, 2012). The most promising is the understanding of the "public" as all socially active citizens living in a particular locality or region (country). As well as public organizations (environmental, consumer protection, etc.). The involvement of the public in a constructive dialogue with the developers of nanotechnologies is all the more important because, in the absence of public sympathy for nanotechnologies and products produced with their help, the latter can suffer the fate of GMOs. In the case of GMOs, attention to the environmental, health and safety implications of these biotechnologies has outstripped the process of their introduction into production and the consumer market. Public concerns about this have significantly slowed the realization of the huge commercial potential of GMOs.

A negative public opinion has been formed regarding them, although the environmental or medical danger of GMOs has not yet been proven. At first, opponents of genetic engineering attributed to all GMO products any potential problems or observed negative effects from any one type of GMO. Then, as the potential benefits of GMOs became more apparent, environmentalists focused on individual GMO crops as the object of particular criticism and oversight (Goldstein, 2010).

Taking into account this negative experience of public rejection of modern technologies, when planning a nanotechnology management system, it is necessary to think through a system of measures to increase public confidence in this industry. One of the directions of this activity may be the financing of a series of toxicological examinations by several countries of the world (but not by companies producing

nanoproducts). These examinations will allow you to obtain and evaluate comparable results using the same methods. However, the coordination of research methods, their implementation, and discussion of their results can take many years, while this problem is relevant now. Given the rapid market penetration of nanotechnology and the products that contain it, existing regulatory approaches cannot even be used to identify it. Not to mention the management of these processes before the results of the examinations become generally accepted. A large number of studies already suggest that many nanoparticles are not benign and can affect biological activity at the cellular, subcellular, and molecular levels. After all, nanomaterials are so small that they can be embedded in human cells and even change biological processes at the cellular level. No less significant are their potential threats to the environment, which require the development of a new generation of technical regulations, as well as new waste disposal technologies. Returning to the issue of interaction with the public, it should be noted that it seems appropriate to create special coordination bodies under the President of the Russian Federation and governors in the constituent entities of the Russian Federation. Who could participate in the discussion and solution of both modern environmental problems and be focused on a broader range of national security issues, including the tasks of ensuring the sustainable development of the Russian Federation.

The Ministry of Natural Resources and Ecology of the Russian Federation and its local authorities could coordinate the process of public discussion of the advantages and potential dangers of nanotechnology. Such a dialogue would facilitate the creation of new environmental management strategies that, together, could build public confidence, help avoid situations of unnecessary risk, and accelerate the development of technologies with greater public and business benefits. This organ could also launch a broad educational campaign, both with the help of traditional media (television, newspapers, magazines) and with the help of new Internet technologies (Inshakova et al., 2018). As well as social advertising, this is placed, for example, on billboards along transport highways. The potential for implementing educational campaigns in schools and universities is also very high. For example, recommendations on the inclusion in the curricula of the master's degree in the legal specialty of special subjects that reveal the features of legal regulation (and the dangers) of nanotechnology.

In the context of increasing computer literacy of the country's population, it would not be enough to use only the sites of environmental (or other bodies) of state power, reports, reports, or draft regulations posted there for dialogue with the public. More promising is the creation of a special Web site that regularly publishes reliable information about developments in the field of nanotechnology. This includes both the risks and benefits of nanotechnology, information on the development of state regulation of the industry, as well as information on industry standards and approaches to self-regulation.

With the development of nanotechnology, it seems inevitable that organizations that produce products containing nanomaterials will face the threat of legal liability. If exposure to nanomaterials causes harm to public health or the environment. The civil liability system plays an important role in making decisions about whether to market

potentially dangerous nanoproducts. One of the key issues in tort liability is whether manufacturers of nanoproducts should be held liable only for known risks. Or they should be held responsible even if they could not reasonably have foreseen such risks (Dana, 2010). The answer to this question will also affect the development of the risk insurance market for the development and implementation of nanotechnology, including in Russia.

The following management solutions are proposed for discussion:

1. Introduce mandatory labeling of products manufactured using nanotechnology. In this regard, significant experience has already been accumulated in different countries of the world related to the labeling of GMO products. This measure will allow consumers to determine that whether nanoscale materials are contained in the products they buy, and to investigate the health and environmental impact of nanoscale products. This labeling program should also tell consumers how to properly dispose of items containing potentially hazardous nanoscale materials. Such a measure has been in place for several years in the EU (Stokes, 2012), whose experience can be used.
2. Regular supervision of nanotechnology is necessary, although problematic. The need to regulate the production and circulation of nanomaterials is caused by two interrelated considerations. First, if the use of certain nanotechnologies is not regulated, it can create very real (although not fully realized) risks of significant disruption to human health or harm to the environment. Secondly, public confidence in new technologies requires an increase in the efficiency of the regulatory authorities, which must promptly identify such potential and real threats. Thus, the environmental supervision authorities of the EAEU countries should have a new function, for which they are not yet ready. One of the problems is that "nanotechnology" is a poorly defined, insufficiently understood set of various products, processes, and technologies. Which is not easily covered by any existing regulatory definition, model, or system. At the same time, many traditional nanotechnology management tools do not work, which requires the search for new ways to regulate their use and turnover (Marchant et al., 2010).
3. Following the existing ideas in the modern theory of environmental management, conclusions about the real or potential danger of nanotechnology should be based on reliable scientific evidence. If the environmental management bodies begin to arbitrarily exercise regulatory influence on entrepreneurs engaged in the production of nanoproducts using nanotechnology. This will create, at least, excessive administrative barriers, and, at most, the ground for corruption. Thus, the risks and dangers of nanotechnology must be proven, and this requires the environmental management bodies to develop original methods for measuring the negative impact of nanotechnology on the health of citizens and the environment. However, even if such a task can be solved concerning existing types of nanotechnology, it will not save in the future. Because scientific and technological progress does not stand still, and new types of nanotechnology are introduced every year. However, even if such a task can be solved in relation to existing types of nanotechnology, it will not save in the future.

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Nanotechnology is already progressing from using relatively simple nanoparticles to more complex and active materials, such as sensors, multifunctional drugs, and medical devices (Inshakova et al., 2020). It will be difficult for a slow-moving bureaucracy to aim at such a fast-moving object. And if excessive restrictions are created for such a business, it can move to other countries, where a more comfortable business environment is created. In addition, this will negatively affect the demand from consumers, who will reasonably consider the following. Significant efforts of the administrative apparatus to regulate and verify nanotechnologies and nanoproducts are established because of their danger to health and nature, which, as already noted, has not yet been proven. Therefore, concerning Russia and the UES countries, at the current stage of nanotechnology development, it is more appropriate to start managing these processes by creating a system. The system should include monitoring, summarizing the experience of using nanotechnology, conducting expert examinations, and only then making decisions.

4. One of the ways to solve the problem is to develop a system of self-regulation in the business related to nanotechnology. Such a measure will create additional guarantees for compensation for damage caused by nanotechnologies and nanoproducts if such is proved. Article 3 of Federal Law No. 315-FZ of 01.12.2007 (as amended on 03.08.2018) "On Self-Regulating Organizations" implies the following. Among the requirements for a self-regulating organization, among other things, are the existence of standards and rules of business or professional activity that are mandatory for all members of the self-regulating organization. As well as providing a self-regulating organization with additional property liability of each of its members to consumers of manufactured goods (works, services) and other persons. The introduction of such a mechanism in certain areas of business activity (e.g., construction) has proved quite successful, which allows us to use this experience in this area. At the same time, there is no doubt that the development of self-regulation in the production of nanoproducts does not cancel state regulation and control. Separately, it is worth highlighting the option of further development of the system of voluntary certification of products, which is already gradually developing.
5. Introduction of voluntary measures for additional reporting of nanoproduct producers. Such measures, in particular, have already been introduced by BASF Corporation in Germany, Buhler Partec in Switzerland, Du Pont Environmental Defense in the USA, some trade organizations (IG-DHS in Switzerland), as well as some other enterprises (Belokrylova, 2014). There are examples of mandatory reporting, for example, the first national rule requiring reporting on nanomaterials was established by France (Kaddour, 2013). There are cases when it was introduced at the municipal level. So, the municipal council of the city of Berkeley (USA) amended its municipal code. By requiring companies that produce or use engineered nanoparticles to disclose toxicological information, as well as information about pollution prevention. Any enterprise producing

or processing nanomaterials was subject to regulatory disclosure requirements (Lerer, 2013).

29.3.3 Existing Achievements in the National Legal Regulation of Nanotechnology in Russia and Other EAEU Countries

At the moment, Russia and other EAEU countries have taken certain steps to create a legal framework for the use of nanotechnology and to guarantee the safety of the resulting nanoproducts.

1. GOST R 54336-2011. National Standard of the Russian Federation. Environmental management systems in organizations that produce nanoproducts. Requirements (approved by the Order of Rosstandart No. 148-st of 27.06.2011). This standard sets out additional requirements for the environmental management system in the design and development, production, and, if applicable, installation and maintenance of nanoproducts. In particular, this GOST establishes that the organization must develop, implement, and maintain a procedure for collecting and analyzing information about the properties of nanotechnologies and nanoproducts, which are related to environmental aspects—for timely updating of the list of environmental aspects and the list of significant environmental aspects. The organization should provide stakeholders with information about its significant environmental aspects related to nanotechnology and nanoproducts. The Organization should develop, document, implement, and maintain a procedure for identifying potential emergencies and accidents, which are associated with nanotechnologies and nanoproducts that can have negative effects on the environment.
2. Decision of the Commission of the Customs Union of 09.12.2011 No. 880 (ed. of 24.12.2019) "On the adoption of the Technical Regulations of the Customs Union "On food safety". This technical regulation stipulates that food products of a new type are food products (including food additives and flavorings) that have not previously been used by humans for food in the customs territory of the Customs Union. Namely: with a new or intentionally altered primary molecular structure; consisting of or isolated from microorganisms, microscopic fungi, and algae, plants, isolated from animals, obtained from GMOs, or using them, nanomaterials and nanotechnology products. Except for food products obtained by traditional methods, which are in circulation and, due to experience, are considered safe. Thus, nanoproducts have entered a larger classification group that is subject to legal regulation that is mandatory for use in the member states of the Customs Union.

3. Resolution of the Chief Sanitary Doctor of the Russian Federation of July 23, 2007, No. 54 "On the supervision of products obtained using nanotechnology and containing nanomaterials". According to the decree, legal entities and individual entrepreneurs who produce and import products obtained using nanotechnology and/or containing nanomaterials are *recommended* to indicate the following. In the information for consumers—information about the use of nanotechnology or nanomaterials in the manufacture of products. When submitting documents for the sanitary and epidemiological examination of products—provide information about the use of nanotechnology or nanomaterials with confirmation of the safety of their use for humans. In addition, it is proposed to organize work on the objective information of the population on the use of nanotechnologies and nanomaterials.
4. Guidelines 1.2.2636-10.1.2. Hygiene, toxicology, sanitation. Conducting sanitary and epidemiological expertise of products obtained using nanotechnologies and nanomaterials. The guidelines were approved by Rospotrebnadzor on 24.05.2010. According to this document, the sanitary and epidemiological expertise of nano industry products is the activity of the Federal Service for Supervision in the Field of Consumer Rights Protection and Human Well-being. As well as its territorial bodies, federal-state health institutions—centers of hygiene and epidemiology, as well as other organizations accredited in accordance with the established procedure to establish compliance (non-compliance) of products with state sanitary and epidemiological rules and regulations, technical regulations. Sanitary and epidemiological examinations of products are carried out for the following purposes. Identification of nano industry products that pose a danger to human life and health, as well as the possibility of causing harm to human health during the manufacture, circulation, and use (use) of products. Assessment of compliance (non-compliance) of nano industry products, conditions of their manufacture, and turnover with the requirements of the legislation of the Russian Federation. Evaluation of the effectiveness of measures to prevent the harmful effects of nano industry products on human health during their manufacture, circulation, and use (use). As well as during the disposal or destruction of low-quality and dangerous products. All nano industry products produced in Russia or imported to the Russian Federation are subject to sanitary and epidemiological expertise. If such products: (a) are intended for use by the population as consumer products; (b) it is possible to receive significant amounts of nanoscale components that are part of the product into the human body during all stages of the product life cycle; (c) possible contamination of nanoscale components that are part of the products of the nano industry, objects of the natural environment that have a direct or indirect effect on the human body. Nanoindustry products that have passed the examination are subject to state registration with the Federal Service for Supervision of Consumer Rights Protection and Human Well-Being.

Thus, we see that certain aspects of the production of nanoproducts have received their legal regulation in fragments, which, however, is not systemic. Moreover, if we

turn to the federal laws "On Sanitary and Epidemiological Welfare of the Population" of 30.03.1999 No. 52-FZ (as amended on 13.07.2020) or "On Environmental Protection" of 10.01.2002 No. 7-FZ (as amended on 08.12.2020), we will not find any mention of nanotechnologies or nanoproducts as an object of legal regulation. The situation is similar in other EAEU countries. Thus, the Law of the Republic of Belarus of November 26, 1992, No. 1982-XII (as amended. June 18, 2019) "On Environmental Protection", as well as the Law of the Republic of Belarus of January 7, 2012, No. 340-Z (ed. of June 15, 2019) "On Sanitary and Epidemiological Welfare of the population" do not contain any mention of nanotechnology, but at the subordinate level, as in Russia, certain steps have already been taken. For example, certain obligations in relation to nanotechnologies are mentioned in paragraph 38 of the Resolution of the Ministry of Health of Belarus "On Approval of Sanitary Norms and Rules" (registered in the NRPA of the Republic of Belarus on January 11, 2013, No. 8/26755). Concerning organizations engaged in the production of food products using food additives, flavorings and technological aids.

Similarly, nanotechnologies are not mentioned in the Fundamentals of the Legislation of the Republic of Armenia of June 9, 1991 "On Nature Protection" or the Law of the Republic of Armenia "On Ensuring Sanitary and Epidemiological Safety of the Population of the Republic of Armenia" of December 12, 1992 (as amended) from 04.12.2019). The study of the Law of the Kyrgyz Republic "On Public Health" of July 24, 2009, No. 248 (ed. of 07.05.2020) leads to the same results. This law replaced the law on the sanitary and epidemiological welfare of the population. As well as a study of the Law of the Kyrgyz Republic "On Environmental Protection' of June 16, 1999, No. 53 (ed. of March 23, 2020). We believe that the Environmental Code of the Republic of Kazakhstan dated January 9, 2007, No. 212-III (as amended on 09.11.2020) is the most perfect environmental legal act. Both from the point of view of legal technology and in terms of the coverage of modern threats to environmental safety within the framework of the EAEU and the CIS. It also does not mention nanotechnology as an object that poses a danger to the environment. Measures to prevent threats to the health of citizens from nanotechnology are not mentioned in the Code of the Republic of Kazakhstan on the Health of the People and the Health System of July 7, 2020, No. 360-VI. The Code replaced the law on the sanitary and epidemiological welfare of the population. At the same time, as in Russia, Kazakhstan has adopted a number of by-laws (GOST) on various aspects of the use of nanotechnology.

So, in the EEC countries, nanotechnologies are not subject to protection in environmental or sanitary legislation. Although their fragmentary references are already found in secondary sanitary (but not environmental) acts. It seems that the implementation of the international precautionary principle is impossible (reflects an attempt to find a compromise between two competing social problems—increased anxiety about the possible adverse effects of new technologies on the environment and health, and the scientific and economic desire for technological innovation) (Perez, 2010). This is impossible without the development of national environmental and health legislation, which guarantees the human right to health and a favorable environment.

In turn, to coordinate the efforts of national states, an international convention on the safety guarantees of nanotechnology and nanoproducts should be developed.

29.4 Conclusions

At the moment, all regulatory regulation of the environmental and sanitary hazards of nanotechnology in Russia is enshrined in by-laws, which are often only advisory. It seems that the Federal Law "On Environmental Protection" of 10.01.2002, as well as the Federal Law "On Sanitary and Epidemiological Welfare of the Population" of 30.03.1999, should be supplemented with special articles. These articles should contain the minimum necessary amount of protective measures against real or potential threats to human health and the environment. Which are associated with the mass use of nanotechnology and nanoproducts. These articles should contain measures for mandatory labeling of nanoproducts. According to the state registration of nanoproducts of medium and high danger. For carrying out its sanitary-epidemiological and other examinations, depending on the degree of potential environmental danger of such products. To fix the obligation to conduct at the expense of the federal one on the presence of environmental consequences from nanotechnologies and nanoproducts for the environment and human health. They should result in changes to the current system of environmental standards and technical regulations. Also, measures to develop new methods of environmental and sanitary supervision and new types of offenses that are associated with non-compliance with these sanitary and environmental measures. These articles should contain measures for mandatory labeling of nanoproducts. According to the state registration of nanoproducts of medium and high danger. For carrying out its sanitary-epidemiological and other examinations, depending on the degree of potential environmental danger of such products. To fix the obligation to conduct at the expense of the federal one on the presence of environmental consequences from nanotechnologies and nanoproducts for the environment and human health. They should result in changes to the current system of environmental standards and technical regulations. Also, measures to develop new methods of environmental and sanitary supervision and new types of offenses that are associated with non-compliance with these sanitary and environmental measures.

An alternative solution could be the adoption of a separate federal law on the development of nanotechnologies and the turnover of products obtained from their use, which would contain a special section (chapter) on guarantees of the rights of citizens from their dangerous consequences. In addition, it is necessary to carry out a set of measures in the field of environmental education and education. It is also necessary to strengthen international cooperation, including the adoption of some international documents regulating the creation of an international information resource. Such a resource should contain the results of scientific research on the negative impact on the environment of nanotechnologies and nanoproducts (with the

establishment of the mode of its use). This will allow for more rational use of the scientific, technical, intellectual, and another potential of the leading countries of the world. It will also allow you to quickly exchange information about such studies.

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