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The Impact of Digital Technologies on the Development of Self-Regulation

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ABSTRACT
The management of digital and nanotechnologies is currently aimed at limiting existing risks: economic, political, social, entrepreneurial, and others. At the same time, such management does not limit their capabilities. In the foreign literature, which is analyzed in this study and which is devoted to effective approaches to management, approaches that directly affect the development of the institution of self-regulation are ignored. It should be noted that nanotechnology research, which can be categorized as digital technology, is the science and technology of controlling matter at the nanoscale (which ranges from about 1 nm to 100 nm). It has tremendous potential to address the major problems of society in areas such as medicine, agriculture, ecology, and engineering. Despite these advantages, both researchers and policymakers believe that nanotechnology is fraught with risks and uncertainties. These advantages and risks can be avoided by using the instruments of the institution of self-regulation.
Keywords: *self-regulation, nanotechnology, digital technology, innovation, entrepreneurial turnover, government regulation of entrepreneurial activity, information environment*

1. INTRODUCTION

While some studies base their analytical studies and conclusions through the use of the category of responsibility of the subject for the introduction of legal objects containing nanoparticles in civil and business turnover. All this indicates that digital and nanotechnologies do not always contribute to the improvement of public relations, but there are also cases when such objects can be potentially dangerous to humans and the environment [1]. Other studies consider some means and mechanisms of protection of those industrial nanotechnologies that are introduced into the production of high-precision innovative products [2].
An institutional approach. I.V. Ershova, who believes that "the legal support of self-regulation is based on a combination of imperative and dispositive principles, using both private and public legal means of influencing the behavior of business entities. Self-regulation is a complex legal institution of the branch of business law, which includes norms that regulate both private and public relations" [3]. The relevance of this line of research is supported by the emergence of institutions whose efforts are aimed at regulating production processes based on the use of digital and nanotechnology objects in them, as well as bringing "safe" nanoproducts to the market.
Consequently, the direction of research in the field of digital and nanotechnology management has developed and in it, the main focus is currently on the potential social and ethical consequences of the nanoscale of science and technology [4]. It should be noted that in different countries, different bodies or organizations exercise control over the safety and use of such objects with nanoparticles (for example, in the USA it is the Environmental Protection Agency, the American Food and Drug Administration, the Occupational Safety and Health Administration, etc.)
Doctrinal approach. In this connection, it is fair to cite two categories that have formed in the Russian legal doctrine. So, Otnyukova G.D. believes that this is, on the one hand, the state's influence on the economy and, on the other hand, the state regulation of entrepreneurial activity. Thus, the state's impact on the economy can be defined as the purposeful activity of the state (its bodies), carried out in a legal form, in which the state's economic policy is implemented. At the same time, state regulation of entrepreneurial activity is the state's influence on it by adopting regulatory legal acts, legal acts of individual regulation, organizing control over compliance with legislative requirements for entrepreneurs, and applying incentive measures and liability to violators of these requirements. In this connection, it is concluded that government regulation is a narrower concept than government impact on the economy [5].
Law enforcement approach.
As practice shows, the system of state regulation and control does not always have a positive result of its activities. It is the institution of self-regulation that offers such regulatory instruments that reflect the interests of not only interested parties (members of this community - SRO), but also the state.
In this connection, one should agree with the opinion of Yu.G. Leskova, who believes that "The need to expand business and consumer relations not only actualizes the problems of protecting the rights of entrepreneurs and consumers, but also highlights the issue of the development of social components in business. In this regard, it seems

important to form special mechanisms for the activities of entrepreneurs, including, for example, the creation of professional associations of entrepreneurs capable of performing social functions and developing them in the entrepreneurial sphere. For the purpose of introducing social entrepreneurship into the Russian economy, the state can use self-regulatory organizations to carry out entrepreneurial activities by its members in the public (social) interests.

2. METHODOLOGICAL BASIS OF THE RESEARCH

In the course of solving the assigned tasks of this article, the author relied on various general scientific principles, approaches and methods. One of the main ones is the comparative legal method, which made it possible to reflect the provisions of the dialectical method of cognition in close connection with social relations. The systematic approach made it possible to consider individual norms of Russian legislation not in isolation from each other, but as a single way to protect objects of civil rights. An integrated approach helped to determine the place and role of digital technologies in the legal science system. The conducted research is based on a set of such particular methods of cognition as formal-logical, system-structural, comparative-legal, historical, etc.

3. GENERAL

Self-regulatory organizations (hereinafter - SRO) are able to satisfy the property needs of citizens in the social sphere by establishing requirements for entrepreneurs related to the implementation of social projects (from establishing quality requirements for the provision of social services to the implementation of relevant social programs by entrepreneurs and their financing). In addition, with the help of SROs it is possible to develop social components in the business itself. SROs are a way of organizing entrepreneurial relations, including in the social sphere, and, in fact, should be aimed at creating a business reputation among their members that meets the standards of entrepreneurial activity in developed countries, in which "the social component for them has become a" locomotive "of development in recent decades ..." [6]

In different periods of development in science, various approaches to the regulation of digital and nanotechnology have been discussed [7]. The literature argues that legal regulations are difficult to develop and implement for new technologies such as nanotechnology. First, new technologies are characterized by dynamism and conditional development. Second, politicians cannot determine what should be done, and legislators cannot determine what is prohibited, since the future development of events is unknown [8]. In view of these shortcomings in the legal regulation of new technologies, self-regulation, as a mandatory institution of regulation, was analyzed and discussed as an attractive alternative for regulating the category of digital and nanotechnologies [9].

Potential benefits of digital and nanotechnology.

From an economic point of view, nanotechnology has enormous advantages [10]. Products that use nanomaterials include cosmetics, paints, anti-reflective coatings for glasses and cars, sporting goods, sunscreens, stain-resistant clothing, and organic light-emitting diodes used in laptop computers, cell phones, and digital cameras. [11] The economic scale of nanotechnology manifests itself in a global market with an estimated value of US $ 45.5 billion. Currently, more than 50 countries around the world have already implemented national initiatives in the field of nanotechnology, while in 2004 alone, global investments in R&D amounted to 4.6 billion US dollars. At the same time, the volume of obligations assumed by the authorities in these countries was accompanied by investments from the private sector of companies such as IBM, NEC, Monsanto, and Du Pont [12].

From a digital governance perspective, breakthroughs in nanotechnology research can contribute to systemic economic progress: nanotechnology holds great promise in terms of reducing life cycle costs for developing innovative devices based on new principles and architectures, increasing productivity through the use of molecular technologies/cluster production and the creation of completely new industries [13]. Unlike the generally accepted paradigm, digital technologies are more expensive and provide only disruptive production. At the same time, nanotechnology offers completely new applications that are cheaper from the outset, such as chemical production within the framework of mass production of nanoelectronic circuits. For example, such methods differ from modern methods used in lithography in microelectronics [14].

From an environmental point of view, nanotechnology has tremendous potential for developing new methods of environmental restoration, monitoring and sustainable production, as well as for reducing emissions. Because nanomaterials are lighter and stronger, they can be used to develop more fuel-efficient aircraft and hybrid vehicles to reduce energy consumption. For example, field trials show that iron nanoparticles can be used to cleanse soil by neutralizing pollutants such as PCBs, DDT, and dioxins [15]. However, nanotechnology's greatest hopes for the environment may lie in how it can fundamentally change the way goods are produced [16]. By requiring fewer raw materials and producing less waste and hazardous byproducts, nanotechnology enables bottom-up construction using only the molecules needed by the product.

From a social point of view, nanotechnology promises significant benefits to humanity due to advances in health and medicine [17]. Living systems are governed by molecular behavior at the nanometer scale, where biology, chemistry, physics, and computer simulation converge. The use of nanoscale surfaces and devices will lead to better diagnosis and treatment through more efficient genome sequencing and detection of gene expression, which promotes optimal drug use. The social benefits of nanotechnology can also emerge in the labor market, as they

will lead to large increases in real wages and higher living standards, with only a temporary increase in unemployment as labor and capital moves to new, more valuable applications from those that have been replaced or become less valuable [18]. Nanotechnology will not only displace old methods, but it is also likely to stimulate innovation in old technologies, making them more competitive.

Potential risks of nanotechnology.

Despite the product's effectiveness, nanomaterials carry significant risks that are difficult to predict. The huge variety of uses, properties, exposure routes and disposal means makes it extremely difficult to identify, assess and manage emerging risks [19]. There is little information on how nanoparticles behave in air, water, or soil or on their ability to accumulate in food chains [20]. Knowledge of the chemical properties of a substance in large quantities may not help predict how this substance will behave at the nanoscale [21].

Research to investigate the health risks associated with exposure to nanomaterials is just beginning. Consequently, there are only limited data on its effects on human health and the environment [22]. Moreover, the methods and protocols needed to detect, measure and characterize nanomaterials are in many cases still under development. For example, the effect of nanomaterials on the lungs is discussed, as they can penetrate lung tissue more easily than larger solid materials. Particles deposited in the lungs can lead to chronic lung disease, making the epidemiologically investigated association between inhaled nanoparticles and adverse health effects biologically plausible.

Legal regulation of technology as a management factor.

As described above, the use of nanotechnology in various sectors of the economy carries certain risks. At the same time, both nanotechnology, as objects of turnover, need legal regulation, the definition of criteria, methods and methods of implementation, and the risks to which a subject using such nanotechnology is exposed. In this connection, the development and adoption of clearly established norms of these legal relations will not be able to become a necessary regulator for the protection of all market participants. Therefore, the application of the principles and provisions of self-regulation is now becoming an objective mechanism that goes beyond the usual spheres of application. Developing its own, both uniform and industry-specific standards and rules, each self-regulatory organization (SRO), through legislatively enshrined norms in relation to its activities, has the right to additionally indicate the rights and obligations of its members. Such standards may contain the following rules: 1) prohibiting legal norms that must be observed by all members of the SRO; 2) impose certain measures of responsibility for illegal actions on its members; 3) establish a regime of control over the actions of its members, identifying unscrupulous and a number of others. Therefore, such provisions of the standards can be defined - as a set of legal requirements applied to SRO members in the commercial application of nanotechnology, including rules and mandatory requirements developed by authorized state authorities (including general and industry legislation).

4. RESULTS OF THE STUDY

In addition, introducing the institution of self-regulation to streamline and systematize the activities of entities operating in the development and application of nanotechnology, it should be remembered that the negative aspects of the activities of business and professional entities should be prevented. Of course, the conditions for the suppression of such behavior must also be established in the standards and rules that are adopted by the SRO. In particular, for this it is necessary to establish the following: 1) a reliable probability of detecting a violation, 2) quick, well-defined sanctions that are imposed on an unscrupulous entity and 3) the preventive nature of sanctions as measures of responsibility. In addition, unscrupulous subjects should be liable not only within the monetary limits that they insured by concluding an insurance contract, but also by limiting access to resources (technical sanction). All these measures of responsibility will contribute to the formation of conscientious behavior of subjects of entrepreneurial and professional activity in the nanotechnology market and create a favorable competitive and technological environment for the development of the research area.

5. DISCUSSION OF RESEARCH RESULTS

Petrov D.A., defining the main directions of the institutionalization of self-regulation, delimits the forms of manifestation of self-regulation by the methods of objectification on self-regulatory organizations as a corporate form of self-regulation organization and contractual self-regulation (understood as broadly as possible, which is based not only on contracts, but also on other forms of consolidating relations, based on the achievement of any kind of agreement) [23].

Yu.G. Leskova substantiates the position according to which "self-regulation as a legal phenomenon can be carried out not only on the basis of uniting subjects of entrepreneurial and professional activity into self-regulatory organizations. Regulatory means (and at the same time forms) of self-regulation of business relations are also corporate acts, contracts, unilaterally authorizing transactions. Thus, self-regulation can be considered both in the institutional (as a special subject of law - a self-regulatory organization) and in the dynamic (as the activities of subjects with the aim of regulating and organizing their own behavior) sense [24].

However, at present, the institution of self-regulation is only being investigated as an alternative tool for its application in the field of implementation of nanotechnologies and products containing nanoparticles. At the same time, legal norms in the field of nanotechnology are not only difficult to develop and ensure their mandatory compliance. First, in order to establish effective legal norms, legislators need to know in advance what type of behavior is truly socially desirable. Second, in order to effectively enforce the rule of law, authorities need to monitor the behavior of individual actors and identify illegal behavior. Due to the dynamic

development of nanotechnology and the lack of knowledge about its consequences, these requirements cannot be met sufficiently in this area. Thirdly, if the facts of illegal actions on the part of such entities are revealed, it will be necessary to apply to the judicial or other authorities authorized by the state to resolve the dispute. However, it must be noted that the judicial authorities at all levels are currently not ready to consider such categories of disputes.

Therefore, on the one hand, the establishment of adequate effective regulation of digital and nanotechnology will facilitate their implementation in a competitive market (taking into account the features that were described above). On the other hand, the reluctance of the judiciary to consider conflict situations is the basis for introducing an institution of self-regulation in this area, which, through its standards and rules, as well as bodies (for example, the Disciplinary Committee) will be able not only to effectively exercise control over its members on competitive market, to prevent their unfair actions, but also to take responsibility measures in relation to such subjects (SRO members).

Therefore, to address these issues, it is proposed to create an SRO, the purpose of which would be not only the implementation of the functions [25] indicated above, but also the creation of "a form of joint existence of civil society and the state, in which the state undertakes to ensure the implementation of initiatives of certain subjects of entrepreneurial or professional activities aimed at improving technological processes" [26]. To implement this proposal, it would be necessary to amend the Law on SROs and other legislative acts that are inextricably linked with the activities of SRO members both in the field of construction and in the field of information technology. One should agree with the opinion of M.Yu. Chelyshev and A.V. Mikhailov that "world experience convinces that SRO activities are a more effective measure and form of control over market participants than state control. In countries with developed economies, SROs of entrepreneurs are considered not only as civil institutions representing the interests of entrepreneurs, but also as an important element of the general system of regulation of entrepreneurial activity, complementing or even replacing government regulation" [27].

6. CONCLUSION

A fairly large number of scientists are attracting attention to the topic of "nanotechnology and digital technologies". In this study, we have shown the relative effectiveness of legal norms and provisions of the institution of self-regulation (mandatory and voluntary) in the field of digital technology turnover. The influence of institutional contingencies (autonomy and competition) on the constraining effects of legal norms of self-regulation is also important. At the same time, it should be noted that the institution of self-regulation is a necessary tool for regulating relations developing in the field of digital assets (nanotechnology) turnover. It should be noted that the lack of an empirical base can adversely affect the formation of a new direction in self-regulation in the form of highlighting one of the areas of mandatory membership in SROs - the sphere of digital technologies and assets. It seems that for the development of a legal regime for regulating nanotechnology, it is necessary to take into account two main values: first, the legal mechanisms used must be built and applied, taking into account the different nature of fundamental and applied research. Since fundamental research is related to the direct theoretical activity of research and, it is, is a creative process that depends on its development and is revealed in the results obtained. At the same time, applied research is associated with those theories that were developed or proven at the stage of fundamental development and aimed at developing market proposals. At the same time, it is necessary to be careful about the legal project activities to change certain norms of the current legislation, since the imperative regulation of provisions on possible directions of fundamental research can reduce them. Of course, this can become a threat to the development of scientific activity. A strong legal constraint on basic nanotechnology research that regulators could only formulate on the basis of assumptions could potentially exclude results that could provide valuable starting points for applied follow-up research. While the greater degree of autonomy afforded to basic research researchers further diminishes the effectiveness of the rule of law, it enhances the regulatory power of self-commitment.

It should be emphasized that competition is especially high in applied research, as it is often a race for profit resulting from the development of applications that are successful in the market. In view of the negative impact of the intensity of competition on the effectiveness of the commitment of individual researchers, the tightening of legislative regulation of applied research in the field of nanotechnology, from some side, becomes obvious.

On the other hand, the specific context of different nanotechnology research niches needs to be considered. The development of a common regulatory framework for all research in the field of nanotechnology is possible through the use of the provisions of the institution of self-regulation (through the development of standards and rules (for example, as it is done in the construction industry - added by me, O.S.). The vast heterogeneity of nanotechnology research makes it possible to develop rules only in specific niches, most of which are determined by the disciplines from which the researchers or research subjects originated. Our findings provide theoretically sound and actionable insights for nanotechnology researchers and policymakers who design nanotechnology governance mechanisms.

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