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Intellectual property rights issues in the digital era

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Abstract

The development of information and communication technologies, typical of the digital era, is accompanied by the emergence of new objects of civil relations. Some of such objects are the result of intellectual and creative activity and, consequently, become the subject of intellectual property rights. However, technology is developing faster than legislation.

Therefore, many problems arise in the field of intellectual property due to contradictions and gaps in national legislation. This paper aims to identify the most important difficulties in the field of intellectual property and find ways to overcome them. The article pays special attention to the problems of copyright infringement on the Internet. The need for the development of virtual libraries is considered as one of the directions of knowledge dissemination with simultaneous protection of copyrights. The preventive means of copyright protection against infringement on the Internet are analyzed. It is concluded that, recently, the innovative or digital economy increasingly prevails over the industrial economy, which indicates the beginning of the transition to a digital society.

Keywords: intellectual property; copyright; piracy and plagiarism; virtual libraries; protection of intellectual property rights.

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Cuestiones de derechos de propiedad intelectual en la era digital

Resumen

El desarrollo de las tecnologías de la información y la comunicación, propio de la era digital, va acompañado del surgimiento de nuevos objetos de relaciones civiles. Algunos de tales objetos son el resultado de la actividad intelectual y creativa y, en consecuencia, se convierten en objeto de derechos de propiedad intelectual. Sin embargo, la tecnología se está desarrollando más rápido que la legislación. Por lo tanto, surgen muchos problemas en el campo de la propiedad intelectual debido a las contradicciones y vacíos en la legislación nacional. Este documento tiene como objetivo identificar las dificultades más importantes en el campo de la propiedad intelectual y encontrar formas de superarlas. El artículo presta especial atención a los problemas de infracción de derechos de autor en Internet. Se considera la necesidad del desarrollo de bibliotecas virtuales como una de las direcciones de la difusión del conocimiento con la protección simultánea de los derechos de autor. Se analizan los medios preventivos de protección de los derechos de autor contra violaciones en Internet. Se concluye que, Recientemente, la economía innovadora o digital prevalece cada vez más sobre la economía industrial, lo que indica el inicio de la transición a una sociedad digital.

Palabras clave: propiedad intelectual; derechos de autor; piratería y plagio; bibliotecas virtuales; protección de los derechos de propiedad intelectual.

Introduction

The modern world economy is characterized by radical changes in determining the directions of economic progress. One of the main features of the “new economy”, the “knowledge economy” is the transition from the dominance of material production and the development of the service sector to the emergence of multifunctional information technologies and the penetration of information benefits into almost all areas of the economy. A basic tenet of the knowledge-based economy is that knowledge and information are seen as commercial assets that can be distributed for profit. Obviously, the knowledge-based economy is more important for countries with limited natural resources.

Trends in the development of science, culture, technology and production indicate that humanity has reached the limit in its development, when further progress will be determined mainly by the mental activity of a person. Thus, it is the results of intellectual activity that determine

the strategy and tactics of socio-economic development of any country. Increasing human well-being more and more depends on the ability to acquire new knowledge and apply it.

The digital age modifies all areas of activity in society, including intellectual property. Informatization of society, globalization processes, the latest technologies are changing the essence and spheres of intellectual property objects, and therefore require scientific understanding, disclosure of the essence of the modern paradigm of intellectual property.

The changes taking place in the digital society call for the improvement of intellectual property legislation. Legal conflicts in the sphere of regulation of intellectual property relations require resolution. It is necessary to fill the gaps in the legislation that appear due to the intensive development of information and communication technologies and the creation of new objects of intellectual property.

Therefore, the purpose of this paper is to study the problems of intellectual property in the context of information activities in the digital age and to determine the directions for solving these problems. To achieve this goal, such scientific research methods as analysis, synthesis, comparative method, method of structuring and functional analysis are used. Special scientific methods, such as methods of information and source analysis, made it possible to comprehensively study intellectual property problems in the field of information activities in the digital age.

1. Development of information technologies as a basis for digital society

At the beginning of the last century, the total amount of human knowledge doubled approximately every fifty years, but in subsequent years it doubled every five years. The increase in the amount of information was facilitated by the development of science, engineering and technology, education, production, and therefore there was a need to solve problems related to management, accumulation, processing, transfer of information and knowledge. As a result of scientific and technological progress, mankind created new means and methods of collecting, storing, and transmitting information (Belyakov, 2014).

Information technology means an organized set of processes, elements, devices and methods used for data processing. Such data processing technology uses personal computers and telecommunications equipment associated with appropriate software systems and components to solve specific issues in a chosen subject area. Information technologies can be also defined as a set of methods and means that ensure the collection,

accumulation, storage, processing, transmission and display of information and are aimed at increasing the efficiency and productivity of work. Information technologies are an indispensable component of most types of intellectual, managerial and industrial activity of man and society (Pivnyak *et al.*, 2010).

In accordance with the Law of Ukraine “On the National Informatization Program”, information technology means a purposeful, organized set of information processes using computer equipment that provides high speed data processing, fast information search, data dissemination, access to information sources regardless of their location (Verkhovna Rada of Ukraine, 1998).

The main goal of the National Informatization Program approved in Ukraine is to create the necessary conditions for providing citizens and society with timely, reliable and complete information through the wide use of information technologies, ensuring the information security of the state. At the same time, concepts such as information service (actions of subjects to provide consumers with information products), information product (documented information that is prepared and intended to meet the needs of users), informatization (a set of interrelated organizational, legal, political, socio-economic, scientific-technical, production processes aimed at creating conditions for meeting the information needs of citizens and society based on the creation, development and use of information systems, networks, resources and information technologies, which are built on the basis of the application of modern computing and communication technology).

Scholars note that from the second half of the 20th century, the era of computerization began, during which technologies for improving information search and processing tools were created. At the same time, computers became the basic technical component of the process of informatization of societies, considering that computers are universal technical means of processing any information, an amplifier of human intellectual capabilities and communication tools that use computers are intended for communication and information transmission (Stanko and Bordyugova, 2012). Thanks to software and technical support, operational services, the computer enables access to various types of information for all interested persons and operation of large volumes of information (Tsybalyenko, 2012).

The use of the latest information technologies contributed to the emergence of electronic documents, electronic form of information, electronic resources, electronic products, use of e-mail, use of databases, functioning of data transmission networks, etc.

In Directive No. 2000/31/EC of the European Parliament and of the Council of June 8, 2000 on some legal aspects of information society services, in particular electronic commerce in the domestic market (Directive on electronic commerce) the term “information society” is defined. According to this definition, the information society is a society in which any services are provided at a distance by means of electronic equipment used for processing (including digital compression) and storage of information and at the individual request of the recipient of the services (European Parliament, Council of the European Union, 2000).

Considering the specified definition, it can be confidently stated that the society in Ukraine is an information society. In 2007, the Law of Ukraine “On the Basic Principles of the Development of the Information Society in Ukraine for 2007-2015” was adopted, according to which development of the information area is defined as one of the main directions of state policy. In the mentioned Law the tasks of the development of the information society in Ukraine are also defined regarding opportunities of everyone to create information and knowledge, use it, exchange it, fully realizing its potential, using information technologies, adhering to the principles proclaimed by the UN and contributing to the sustainable development of the country.

The strategic goals of the development of the information society in Ukraine were also determined, in particular, the use of information and communication technologies to improve public administration, in relations between the state and citizens, the creation of publicly available electronic information resources of interaction between state authorities and local self-government bodies and natural and legal persons, citizens guaranteed access to information, access to telecommunications services, in particular to the Internet, to information resources, as well as providing citizens, regardless of their age, with the opportunity to learn, using the full range of information technologies during education, upbringing and professional training (Verkhovna Rada of Ukraine, 2007).

In 2021, an Order of the Cabinet of Ministers of Ukraine dated March 3, 2021 No. 167 “On the approval of the Concept of the development of digital competences and the approval of the plan of measures for its implementation” aimed to determine the priority directions and main tasks for the development of digital skills and digital competencies in terms of development of digital economy and digital society, in particular, increasing the level of digital literacy of the population, regardless of age, working capacity, material security, received education.

This can be achieved by providing opportunities for citizens to acquire digital education using information resources, new educational technologies, and digital educational resources, ensuring the continuous improvement of professional digital competences in the professional

development system of various fields of activity, creating the Unified state web portal of digital education “Action. Digital education”, by developing measures for the implementation of digital means of providing information (television, social networks, broadcasting on the Internet, etc.).

At the same time, provision of legal regulation on issues of state policy formation (with coordination of actions at the level of executive authorities) in the field of development of digital skills and digital competences of citizens and the development of changes to the legislation on the provision of digital education, digital skills and digital competences in the spheres of public life are provided, in particular on matters of determining the requirements for the level of possession of employees, regardless of the field of activity, of digital skills and digital competences, developing indicators to determine the state of development of digital skills and digital competences.

The concept also defines the need to increase the level of public awareness of the dangers of using the Internet, for which it is planned to create and implement programs to increase the level of awareness of children and adolescents, the digital competences of parents and pedagogical workers regarding the dangers for a child in the digital environment, the formation of intolerant attitude to the violation of rights and freedoms, child safety in the digital environment.

The positive effect of the implementation of measures in accordance with the tasks defined by the Concept is the acceleration of digital transformation processes in Ukraine, a significant increase in the competitiveness of employees who possess new digital skills and digital competences, which contributes to the improvement of the quality of human capital and the level of competitiveness of both individuals and the state. The introduction of these measures leads to an increase in the level of accessibility to public services for senior citizens and people with health disabilities (Cabinet of Ministers of Ukraine, 2021).

On July 15, 2021, the Law of Ukraine “On Stimulating the Development of the Digital Economy in Ukraine” was adopted to stimulate the growth of the digital economy through the development of digital infrastructure, creation of favorable conditions for innovation, attraction of investments, human potential (talented specialists). The law establishes the range of organizational, legal, and financial foundations for the functioning of the legal regime of “Diya City” as a self-regulating organization. At the same time, “Diya City” is considered as one of the stages of creating new business opportunities in the IT industry in Ukraine. The law declares non-interference of the state in the work of Diya City.

The types of activity of “Diya City” are defined, in particular:

- 1) computer programming, informatization consulting, computer equipment management activities, including development, modification, testing and technical support of software; other work at all stages of the software development life cycle; development of a command system for creating and executing software - system software, application programs, including computer games, databases, websites; setting up software, including software developed by third parties, etc.
- 2) publication of computer games, as well as other software, including provision and transfer of intellectual property rights to software and its elements;
- 3) provision of software products, provision of web services, including distribution of copies of software in electronic form;
- 4) educational activities in the field of information technologies, including provision of higher, professional pre-higher and vocational education (computer science, information systems and technologies, computer engineering, cyber security, data science,) teaching computer literacy (digital literacy);
- 5) data processing and related activities, including website management;
- 6) research and experimental developments in the field of natural and technical sciences regarding information and communication technologies;
- 7) conducting marketing campaigns and providing advertising services using software according to the relevant list;
- 8) activity of organizers of e-sports competitions, e-sports teams, specialized computer centers, etc.;
- 9) ensuring cyber security of information and communication systems, software products and information processed in them;
- 10) activity of a provider of services related to the circulation of virtual assets (Verkhovna Rada of Ukraine, 2021)

With help of information technologies, literary and cinematographic works are translated into a digital analogy (digitized), electronic online publications and collections have appeared (free access to the texts of electronic books of libraries, to the digital form of collections of museums and galleries with availability for viewing on the Internet).

Digitization means that paper documents are transformed into electronic (digital) analogues (the physical format is transformed into a digital one)

(Mihrovska, 2021). The digitization of documents or technologies should be understood as the process of converting paper documents (or processes that involve paper documentation) into digital form. Digital technologies require digital information, so digitization is a necessary process which brings information to a digital format.

However, for digital transformations, digitization of data is not enough, there is a need in digitalization (Didenko *et al.*, 2022). The latter in a broad sense is interpreted as the process of introducing digital technologies to improve the life of a person, society and the state. As a result, digital governance will be perceived as a digital implementation of public power (a digital form of public governance), which will become a stage in the evolutionary implementation of information and communication technologies in the activities of public authorities (from informatization of public administration to electronic governance, and then to digitalization of public governance) (Kuybida *et al.*, 2018).

Considering the above mentioned, it is possible to state, that modern society:

- widely uses the latest information technologies in all areas (Internet networks, databases, technical devices for high-speed data transfer, etc.), which are one of the important factors influencing its development, allow to simplify complex calculations, increase the speed and volumes of transmission and reception information, (exchange) between users, etc.
- is increasingly moving away from the era of physical labor, when the result of a person's activity is material objects, which serve not only to satisfy the personal needs of the person who created them, but also for their sale.

The new society is reorienting itself to mental work. The main assets of any enterprise are not so much physical units of measurement, such as the availability of land, complex production facilities, office premises, the number of products in warehouses, stocks of raw materials, but intellectual accumulations (Tsymbalenko, 2012).

In the economy of the information society, the main factor is the information resource, preference is given to the activities of production, processing, storage and distribution of information and knowledge, which replace significant wealth, capital, i.e., there is a change in the employment structure; the main sphere of economic activity of the information society is the production of information.

The main resources of society are knowledge and information, which play an increasingly significant role in the economy; at the same time, an information resource differs from financial, natural, labor, technical

and other resources (information as an information resource, as valuable information, can be accumulated, stored and used in the process of life without wearing out, while other resources of the economy are prone to wearing out) (Shtanko and Bordyugova, 2012).

In recent decades, one of the main trends in the development of the economy and society in general is the penetration of information technologies into various spheres of human activity. Nowadays, the development of informatization is primarily related to the introduction of digital communication technologies and platforms, for which the Internet and mobile devices are the basis.

Sectors of the economy, based on information and communication technologies, are called “digital economy” (Yaremenko, 2011). In Ukraine, transition to the digital economy was declared by the Concept of the Development of the Digital Economy and Society of Ukraine for 2018-2020, approved in accordance with the Decree of the Cabinet of Ministers of Ukraine dated January 17, 2018.

This executive act establishes the main goals and directions of digital development, the principles of digitalization, the implementation of digital governance, and declares the creation of conditions for digitalization in the economy, society, education, medicine, ecology, etc., for which it is provided to create market incentives, motivations for the use of digital technologies, products and services among the Ukrainian sectors of industry, business, etc., considering the fact that the path to the digital economy (activities in which the main means (factors) of production are digital (electronic, virtual) data both numerical and textual) through the internal market of production, use and consumption of information, communication and digital technologies.

The activity of the development of innovations and technologies referred to in the Concept takes place, among other things, thanks to the development of the Internet, from the archival repositories of which a large amount of information can be obtained, social networks with constantly updated information, powerful technologies (Google, Apple, Microsoft, Amazon, Facebook) etc.

Consumers of digital technologies are the state, business, and citizens. At the same time, the emergence of the latest technologies, which provides the possibility of electronic communication, leads to an increase in the variety of objects of such communication, which, accordingly, causes the need to include them in the list of objects of intellectual property, to define such objects, as well as to develop actions to prevent infringement of authors' rights for such objects.

Thus, thanks to electronic communication, such varieties as sites, domains, search engines, electronic documents, electronic digital signatures,

electronic commerce, electronic publications, mailing lists, Internet stores, electronic libraries, catalogs have appeared. The application of the norms contained in the relevant legislation on intellectual property to such objects is not entirely acceptable.

The world of digital technologies is not only a new logical stage in the development of the technological sphere of humanity, but also the entire existing legal and socio-political reality. There are still no generally accepted and harmonized legal definitions, but digital technologies are already rapidly capturing the bases for the offensive. Digitization is becoming the most important factor in the economic growth of the economy of any country and is generally a modern development trend (Sosnin, 2022).

2. Impact of information technologies on intellectual property

According to Article 2 of the Convention on the Establishment of the World Intellectual Property Organization (1967), intellectual property includes rights related to: literary, artistic and scientific works; performing activities of artists, sound recording, radio and television broadcasts; inventions in all areas of human activity; scientific achievements; industrial samples; trademarks, service marks, brand names and commercial designations; protection against unfair competition, as well as all other rights related to intellectual activity in industrial, scientific, literary and artistic areas (WIPO, 1967).

At the same time, the Agreement on Trade Aspects of Intellectual Property Rights (TRIPS) dated April 15, 1994 also includes into the list of intellectual property rights' objects computer programs and databases, related rights (rights of performers, producers of phonograms, broadcasting organizations), geographical names, names of places of origin of goods, topography of integrated microcircuits, undisclosed information. Thus, the text of the mentioned Agreement already takes into account the changes that occurred as a result of the development of new technologies.

The development of information technologies, resulting in the emergence of new objects, was also reflected in the Law of Ukraine "On Copyright and Related Rights" (Verkhovne Rada of Ukraine, 2023). It defines the latest intellectual property rights' objects such as database, website, web page, video gram, hyperlink, computer program, digital content etc.

The new spheres of appearance of intellectual property rights' objects are also reflected in the Law of Ukraine "On Stimulating the Development of the Digital Economy in Ukraine" dated July 15, 2021 (Verkhovna Rada of Ukraine, 2021) regarding the right to works developed by gig specialists. According to the first part of Article 24 of the mentioned Law, personal

non-property intellectual property rights belong to such a gig specialist. As for the property rights to the object created by a gig specialist as a result of performing a gig contract, the legislator left such rights to the resident of Diya City as the customer, although the parties to such a gig contract (the gig specialist and the resident of Diya City) have the right to establish a different procedure for the distribution of such rights under the terms of the contract. This position is similar to the position under the Civil Code of Ukraine regarding property rights to computer programs and (or) databases.

The main trends of modern information development affecting changes in the field of intellectual property are:

- ongoing development of the information society, in which the production, use and consumption of information becomes a defining method of activity in all spheres of social life.
- close economic integration of all countries because of liberalization and further increase in the volume and diversity of international trade in goods and services, growth in the number of the workforce and accelerated spread of the latest technologies on a global scale.

The digital economy is a fundamentally new stage in the development of the modern information society, and, accordingly, a shift in emphasis towards the production of knowledge, intellectual capital, the growth of the production of information technologies, software, education services, and the use of innovative methods in management. In the digital age, the success of the economy and, accordingly, the state is not so much connected with the possession of natural resources and gold and currency reserves, but with the high development of science, the increase in the number of people engaged in effective creative research and development, technological development.

In the digital economy, intellectual property issues are of particular importance. This is due to the rapid development of electronic means of communication, the latest digital technologies, as well as the rapid delivery of intelligent products to consumers. The economy of intellectual property in the era of Internet acquires new features, and the Internet, as a super media means of communication, contributes to the globalization of the market for rights to intellectual property objects (Shevchenko *et al.*, 2015).

Intellectual activity is a driving factor in the development of the information society, and in terms of liberalization of world markets, the rapid progress of technologies in the field of international communication systems, the aggravation and changes in the forms of competition, the development of international relations in the field of intellectual property, intellectual property rights are becoming an important tool of global competition of states for access to resources and markets of high-tech products (Logvynenko and Dykovets, 2020).

At the same time, the accumulation of achievements of the state's cultural heritage and scientific and technical potential contribute to the progressive development of society.

In terms of market relations, the results of creative activity can become a product that brings profit to its creator. At the same time, the development of any sphere of creativity is of special importance for the entire society.

The accumulated achievements of the human mind make up the cultural heritage of the nation, determine the scientific and technical potential of society, and condition its progressive development. That is why not only they themselves are interested in preserving creative results and protecting the interests of their creators, but also society as a whole (Kurganova, 2017).

The intellectual property market has the potential for development, but under the condition of the development of a system of protection of the intellectual property rights and state support to stimulate innovation (Bazilevich, 2014).

The duty of the state in the development of the intellectual property institute is to define the state policy regarding intellectual property, the legislative basis for its implementation, guarantees for the protection of intellectual property, and to promote the formation of favorable socio-economic conditions for the development of the potential of intellectual property in order to attract investments in economic circulation, participation in international cooperation on intellectual property issues, implementation of constant monitoring of the compliance of the national and international legislative framework and updating of national legislation in order to meet their requirements with international and European legal norms, as well as the elimination of obstacles to the progressive development of the innovation process at the state level.

Current approach to the use of Internet (absence of national borders, speed of information transfer, user anonymity, freedom in obtaining the necessary information) gives users access to a wide range of information of any kind, and a person who seeks to "get" the information posted in the network, does not care about the observance of the rights of the authors of information, and therefore the issue of protection of the authors' rights is the cornerstone of intellectual property.

At the same time, the Internet complicates the protection of intellectual property rights due to the imperfection of the legal acts, which do not contain norms regarding the protection of information products in digital form, databases on the Internet, copyright, distribution of cheap counterfeit copies, etc. In addition, the sphere of intellectual property relations has expanded in the digital age. New objects of intellectual property appeared - computer programs, databases, websites, network video grams, digital broadcasting (Nekit *et al.*, 2019). Therefore, under the influence of the

development of information technologies, the spheres of occurrence and types of objects of intellectual property rights are growing. This is accompanied by the emergence of legal conflicts and gaps that need to be resolved.

3. Current issues of intellectual property in the digital age and ways of their solution

Internet has become a key technology among the latest technologies and plays a huge role in the distribution of intellectual property objects. States cannot unreasonably restrict individuals' access to the Internet (except when the dissemination of certain information is prohibited by law) and must be responsible for ensuring such access.

Internet has become important in almost all spheres of public and private life. According to the UN, in 2021 the number of Internet users increased from 4.1 to 4.9 billion compared to 2019, in particular due to the COVID-19 pandemic. In the first year of the pandemic, the number of people who started using the Internet increased by 10% - this is the largest annual increase in the last decade (United Nations, 2021).

As a result of the application of the Web 2.0 process, Internet users are both consumers of services and authors. In general, copyright objects are constantly developing and require high-quality protection. This issue became especially relevant after the development and spread of the World Wide Web. The world system has become an integral part of the development of society and the world.

The interaction between the system of intellectual property rights as a category of private law and the sphere of public legal interests, which is the Internet, has the following results:

- the development of technologies makes it possible to track the appearance of new objects of intellectual property law, which in turn allows, taking into account information about such objects, to plan one's future activities, to make forecasts (in the activities of individuals or legal entities, and on the state level);
- increasing the level of the threat of infringement of intellectual property rights, the appearance of an "atypical" place for counterfeiting - the Internet.
- the interdependence of intellectual property rights, other intangible rights of individuals and legal entities on the Internet and the specifics of their implementation.

Modern technologies significantly affect the development of the intellectual property market. The market becomes cross-border and ultra-fast, access to it is simplified, which creates advantages, but there are also risks in terms of effective protection of intellectual property rights.

The advantages of the intellectual property market in the digital age are:

- allocation of objects of intellectual property rights in digital form on the Internet;
- allocation of information products (objects of intellectual property) by authors who do not have the opportunity to distribute their work in any other way;
- expanding the range of product selection for users;
- placing objects in a digitized form helps to reduce costs for providers (saving money on product release, delivery, storage, in particular, maintaining libraries), reducing costs and saving time for users to obtain the desired information product.

At the same time, the risks associated with the imperfection of the legislation are significant. The use of intellectual property rights via the Internet is cross-border, which makes it difficult to apply national legislation in this area in case of the need to protect rights. There is a problem in managing the reproduction and use of intellectual property objects on the Internet, and the difficulty of proving the fact of violations (if information is quickly displayed, changed, or deleted), the complication of technical fixation of the fact of copyright infringement in the global information network as a prerequisite for starting to prove the fact violation (Lucci, 2006).

At the same time, technological developments have made the Internet an extremely effective means of distributing pirated content, causing significant economic damage to the authors of intellectual property (e.g., streaming, unauthorized conversion of a file from a licensed streaming site into an unauthorized copy, music piracy), and also leading to undermining legitimate online services. New times give birth to new technologies and new violations, respectively, especially if there are no preventive measures or there are no legally established norms aimed at collecting money from the violator or applying other responsibility. This situation poses a significant threat to online libraries containing text, music and video files, as well as web pages of printed periodicals with open access.

Types of violations of authors' property and non-property rights on the Internet are illegal reproduction and copying of copyright objects without the prior consent of the author or right holder, distribution of the author's work (in whole or in part) under one's own name without mentioning the author's name (plagiarism).

Internet piracy and plagiarism are easier to commit in Ukraine due to the principle of mainly non-commercial access to information. The Ukrainian user pays a fee only to the provider, and has the right during the paid period to have access, including for illegal purposes, to any information posted on the Internet. It is clear that electronic libraries with digitized text and music files, electronic periodicals with open access, etc., are particularly attractive to violators.

Intellectual property rights play a huge role in global economic growth and development because they affect the profitability of industrial research and the rewards for creative activity. If the protection of intellectual property rights is strengthened, counterfeit products are eliminated, and goods and services on the market are limited to those companies that own intellectual property rights, then the market will become monopolized.

Rights holders will receive a profit, but for users the price may be higher than before due to a decrease in the number of goods and/or services. At the same time, if protection is strengthened, efforts to create new technologies, goods and services are rewarded, which will have the effect of encouraging the activities of new entrants working on the invention and supply of goods and services. As a result, the market becomes competitive, the size of the market expands, and trade becomes active.

As for the market of intellectual property objects, it occupies a special place among the segments of the global market, since it is not standard types of goods and services that are bought and sold, but scientific and technical knowledge, which are the results of innovative developments and research, design, experience of their industrial development, embodied in relevant security documents - patents, licenses, industrial samples, scientific reports, trade secrets, etc. In other words, this market is the foundation of the internationalization of intellectual production and the international socialization of intellectual work.

Thus, the proper level of protection of intellectual property rights is a necessary condition for ensuring social development and fair distribution of intellectual rent. However, the introduction of high standards for the protection of intellectual property and the establishment of a monopoly on its rights can cause the impoverishment of the global bank of knowledge accumulated by mankind and limit the access of poor countries to the global "technological base".

With the development of the World Wide Web, the lack of proper regulation of the activities of the mass media as a means of communication can also be attributed to certain issues affecting the violation of intellectual rights.

The development of the Internet and IT technologies, information wars pose new needs and challenges to states in ensuring legal regulation of

mass media. For example, in Ukraine today there is no official definition of mass media existing on the Internet. This significantly narrows the general understanding of the media. Print mass media can have their own electronic versions, the work of journalists is distributed in social networks, scientific publications can have an electronic version on the Internet.

Legal relations related to mass media activities are regulated by the Constitution of Ukraine, the current Laws “On Information”, “On Access to Public Information”, the Law of Ukraine “On Printed Mass Media (Press) in Ukraine”, “On State Support of Mass Media and social protection of journalists”, etc., however, Internet publications do not find sufficient legal regulation. However, Ukrainian legislation still does not contain norms that would reflect the peculiarities of the use and protection of an information product (work) on the Internet (Nekit *et al.*, 2020).

It seems that author’s self-actions to independently protect intellectual property on the Internet can significantly contribute to the intellectual property protection. Thus, copyright owners have a wide range of technical and legal options for protecting copyright and related rights on the Internet. Which one to choose depends on the nature of the work, the objective form of existence and the restrictions on use established by the author. Conventionally, technical methods of copyright protection on the Internet can be divided into methods of identification of copyright objects and related rights, access restrictions, cryptographic conversion, etc. The use of protective means depends on the nature of the protected intellectual property.

Regarding the determination of preemptive actions, in particular, in the distribution of the object of copyright, it is considered possible to take such protective actions regarding one’s intellectual property at the stage before the violation (Ivashenko, 2012). Thus, the author has a right to:

- limit functionality, that is, distribute programs that are not capable of printing documents or storing them in the computer’s memory.
- set the date after which access to the object will be impossible and (or) set how many times the file can be copied or set the frequency of issuing the command to open the product, i.e. the information product is unavailable after a certain number of views and (or) copies (for example, after 10 viewings of a computer file, it will be impossible to view), use so-called code words (the introduction of rare and exotic words into the text, which can be used to trace the use of one’s own work);
- carry out preliminary publication of information products, with notarization of the date of creation and (or) publication, to have confirmation of the fact of such date.

- record on a laser disc with transfer to an archive or web depository.
- mark information products with a label that will be activated during unauthorized use of the products, providing an opportunity to find the copyright infringer.
- installation of the copyright icon (©), although this icon does not protect against content theft, but its presence is an indirect protection, declaring to users who is the author of the object and showing that the author is able to control the use of works on the Internet and, in case of infringement of copyright and related rights, provide confirmation of his or her authorship.
- provide access to the Internet resource for a fee, in particular, copyright holders can protect their rights to works by distributing them in crypto-envelopes and requiring users to pay for keys that can be used to “remove” the work from the “envelope” as a limitation of the copyright owner functionality of the work (the user is provided with a copy of the work with functional limitations, for example, the full version is provided after appropriate payment for acquisition and (or) renewal, etc.);
- to protect the information product from unauthorized use on the Internet by creating a web repository that allows registering intellectual property objects on the Internet and fixing their legal status, that is, determining who owns this object.

An effective measure of copyright protection at the stage of their violation can be considered the use of computer programs that automatically execute predetermined commands, for example, search the Internet for copies of counterfeit works, or identify the infringer with the help of a special mark that is placed in the work and is triggered during unauthorized use, which provides the possibility of identifying the copyright infringer (Cantatore, 2021).

Despite the absence of a requirement for mandatory state registration of copyright and contracts relating to the author’s right to a work, registration of a work, as defined by the Resolution of the Cabinet of Ministers of Ukraine “On State Registration of Copyright and Contracts Concerning the Author’s Right to a Work” (Cabinet of Ministers of Ukraine, 2001) is one of the most effective proofs of copyright infringement on the Internet.

Although the issue of the circulation and protection of intellectual property is not new, but due to the rapid progressive development of new technologies, there are difficulties in applying liability to violators due to the inability to provide an evidentiary basis for the committed violation (Nekit *et al.*, 2020). With the development of new technologies, which is a positive dynamic of the development of the information society, there is a need to update the legal framework regarding intellectual property rights.

The strengthening of copyright protection would be facilitated by the implementation at the state level of appropriate measures to empower the author to apply prejudicial actions when placing intellectual property objects on the Internet and directly at the stage of violation of such rights.

In order to protect intellectual property rights, it is also worth paying attention to the possibility of more significant state support and expansion of the work of virtual libraries and virtual reading rooms in Ukraine. On the one hand, they provide access to the necessary information, and on the other hand, they protect the copyright of the owner. Some libraries have already begun to operate in Ukraine (Library of Ukrainian Literature “UkrLib”, Ukrainian electronic library “Libruk”, Book Brotherhood “Flibusta”, Electronic Library “Ukrainian Literature”, Ukrainian and foreign literature in Ukrainian “Shift Library CMS”, Electronic Library of the National libraries of Ukraine for children, Children’s public online library “Chitanka”).

A virtual library is defined as an online research environment in which digital materials are made available for free, with intentionally limited downloads. Cloud services make it possible to store information, including in libraries and reading rooms of state bodies. This technology is simple and provides access to collections of books, magazines, presentations, educational materials, helps to protect copyright and intellectual property (Ugwu, 2019).

With such an approach, users can become new partners and help improve their service, and the services provided by library institutions in the electronic environment can be expanded to reach a wide range of remote users and materials, both in terms of content and in terms of available new technologies. This is how audio and video content are used.

In terms of modern scientific and technical development, access and knowledge of relevant materials are of great importance for the realization of human rights to information, education and development while preserving property rights and copyrights for relevant works placed in virtual libraries. Virtual reading rooms generally protect the author’s rights from illegal use and promote copyright enforcement. The mission of the authorities and the government is to provide citizens with legal standards that meet modern realities, and to maintain such an unstable balance of interests between copyright owners and users.

Among the difficulties in the development of intellectual property rights protection is the issue of financial and organizational support, as there is a need for constant modernization and innovation in this area, because new forms and technologies of infringement of intellectual property rights appear due to gaps in legal regulation. Therefore, the question arises of attracting innovations and investors who are ready to manage and approve

the development of information technologies and methods of intellectual property protection.

Ukraine is taking increasingly effective steps to solve the problem of intellectual property. Thus, the National Economic Strategy of Ukraine for the period until 2030 contains the principle of protection of intellectual property rights. This document contains long-term and short-term plans for each item and is mandatory, and the first step in this direction should be the adoption of an intellectual property development strategy. After all, intellectual property is an important tool for creating an environment that enables innovation, investment, invention and the development of creative industries.

Full protection of intellectual property rights and the creation of tools necessary for their functioning will contribute to the development of human capital as the greatest asset of the Ukrainian government.

We should also not forget about such threats as cyberterrorism and cyberespionage as a global problem of information security: with deliberate illegal actions by other persons, information can disappear or be changed beyond recognition. The rapid development of technologies leads to the growth of the information array, which can then be used both for good and in an information war. Computer technology and the proliferation of digital networks have fundamentally changed the way ideas and information are collected and manipulated, and this has given rise to new conflicts between public use and private rights.

From the security perspective, any kind of electronic communication is extremely vulnerable - with help of technical means, any information can be removed from computers. There are, of course, methods of protection, but there are no guarantees that they will work.

The threat is not only that the special state services are able to connect and "take" information even from optical fiber (digital) cables with help of technical means. The free market of technical means, unfortunately, provides access to huge volumes of data through modern communication networks to foreign intelligence and criminal structures, which constantly produces new threats and challenges.

Thus, the most disturbing issues of intellectual property in the information and communication sphere include the following: imperfection of the legislative framework, lagging behind foreign legislative and normative practices of intellectual property regulation, the need to adapt to international agreements in the field of intellectual property.

Conclusions

Recently, the innovative or digital economy increasingly prevails over the industrial economy, which indicates the beginning of the transition to a digital society. The modern framework of the development of Ukrainian society allows us to confidently state that the society in Ukraine is already informational. However, the digital age brings not only advantages, in particular, the possibility of using technical solutions, access to the global Internet, rapid exchange of information, development of the service sector, increasing value of knowledge as the basis of the digital economy. The active development of information technologies also contains danger and threatens human rights.

The development of the information sphere, the growth of the value of information and knowledge, leads to the stimulation of intellectual activity, the results of which are, in particular, objects of intellectual property rights. The spheres of occurrence and types of intellectual property objects are expanding. In the digital economy, intellectual property issues are of particular importance. This is due to the rapid development of electronic means of communication, the latest digital technologies, as well as the rapid delivery of intelligent products to consumers.

The intellectual property market has the potential for development, but under the condition of the development of the system of protection of intellectual property rights, state support to stimulate innovation. The duty of the state in the development of the intellectual property institute is to define the state policy regarding intellectual property, the legislative basis for its implementation, guarantees for the protection of intellectual property, and to promote the formation of favorable socio-economic conditions for the development of intellectual property in order to attract investments at the state level.

Copyright infringement on the Internet, in particular, piracy and plagiarism, is an especially problematic area. The strengthening of copyright protection would be facilitated by the implementation at the state level of appropriate measures to empower the author to apply prejudicial actions when placing intellectual property objects on the Internet and directly at the stage of violation of such rights. It would be also helpful to pay more attention to the development of virtual libraries with appropriate technical means for copyright protection. Support of virtual libraries at the state level will ensure both access to information and protection of authors' rights at the same time. Ultimately, this will contribute to the development of society in the digital age.

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