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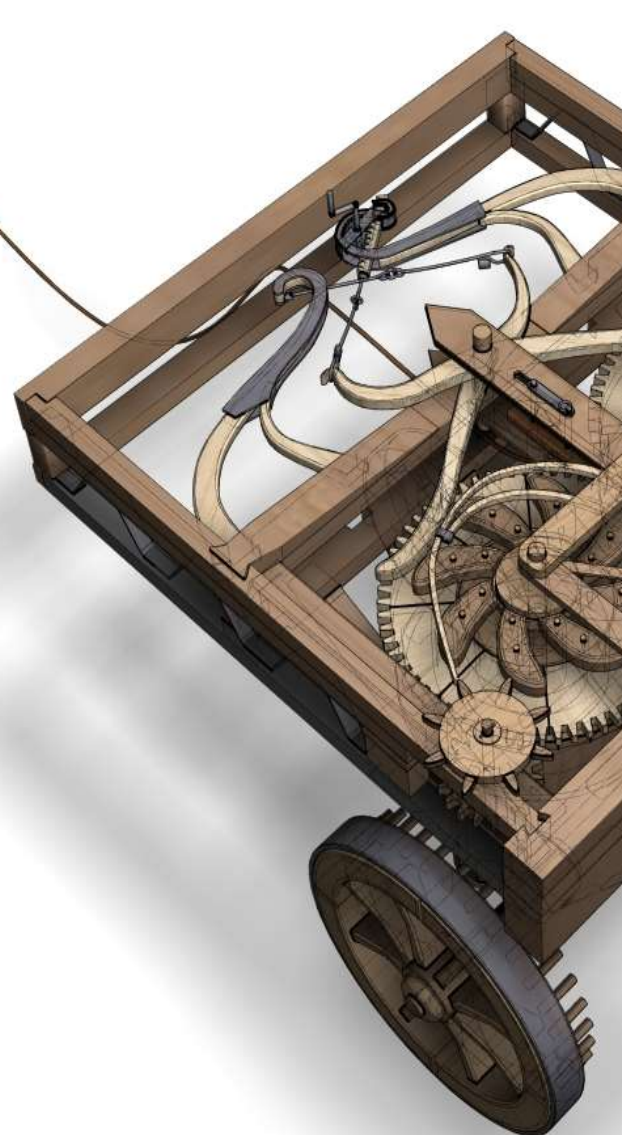
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Table of Contents:

1	Stakeholder Perceptions of Socio-Ecological System Improvements: A Place-Based Study of Stream Habitat Enhancements	5
	Josh SMITH, Paul J KINDER Jr., Steven SELIN, Jamie HOFFMANN	
2	Innovations – the Basis Tools of Development of Agricultural and Ecological Management	19
	Olena V. MORAVSKA, Taras R. LEVYTSKY, Volodymyr O. VELYCHKO, Olena M. ORLOVA, Yurii A. SHULZHYK, Svitlana SENYSHYN	
3	Developing a Conceptual Model of Employee Ecological Behavior using an Integrative Approach	29
	Khalid FAROOQ, Mohd Yusoff YUSLIZA, Zikri MUHAMMAD, Jumadil SAPUTRA	
4	Priority Areas for Increasing the Competitiveness of the Agro-Industrial Complex and Environmental Sustainability	39
	Arailym NURMANBETOVA, Yerzhan ZHUSSUPOV, Galiya AKIMBEKOVA, Yelena GRIDNEVA, Gulnar KALIAKPAROVA, Yury KHAN	
5	The Impact of Sustainable Development and Social Responsibility on Quality Education	51
	Ana Cecilia CHUMACEIRO HERNANDEZ, Judith Josefina HERNÁNDEZ GARCÍA, Jovana Cristina VELAZCO HERNÁNDEZ, Yuriy Mikhailovich LAGUSEV, Anna Pavlovna ROGOZHINA	
6	Cluster Analysis of the Expenditures for Environmental and Technological Innovations in Sustainable Development Policy Formation	63
	Ekaterina V. TSENINA, Tamara P. DANKO, Vladimir M. KISELEV, Lyubov A. CHAYKOVSKAYA, Nikita D. EPSTEIN, Ona RAUSKIENE, Vladimir D. SEKERIN	
7	Interrelationship between Three Dimensions of Sustainable Performance Measurement among Malaysian Manufacturing Companies	75
	Boon Heng TEH, Abdul Aziz ABDUL RAHMAN, Tze San ONG, Sin Huei NG, Hussain Bakhsh MAGSI	
8	Water Resources as the Material Basis for Further Strategic Development of the Republic of Kazakhstan	99
	Kuanysh KUSMAMBETOV, Saule SULEIMENOVA	
9	Do Fishers Need Enough Insurance to Guarantee Their Business Continuity? Evidence from Vulnerable Small-Scale Fishers	107
	SUHARNO, Agus ARIFIN, Ary YUNANTO	
10	Digitalization of Environmental Information in the Republic of Kazakhstan: Issues of Legal Regulation	115
	Lazzat YERKINBAYEVA, Daniya NURMUKHANKYZY, Bakhytzhan KALYMBEK, Aigerim OZENBAYEVA, Zhanna KALYMBEKOVA	
11	Determination of Dissolved Pesticide Leachates in the West Africa's Largest Natural Lake	128
	Amina GARIBA, Jonathan OSEI-OWUSU, Albert ANIAGYEI, Boniface Yeboah ANTWI, Ralph KWAKYE, George ADUSEI, Aboagye Kwarteng DOFUOR, Bright VIGBEDOR	

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12	Management of Unemployment and Employment of Youth in the Labor Market as a Factor of the Key Direction of Sustainable Development of Kazakhstan Bibinur KORGAN, Rysty SABIROVA, Saule KUNYAZOVA, Elmira ADIYETOVA, Zukhra TURDIYEVA, Zhanargul BISSEMBIYEVA	135
13	Productivity Loss Due to Deaths Caused by Cardiovascular Diseases Associated with Exposure to Air Pollutants in Sorocaba, Brazil in the Years of 2015 to 2017 Pedro Rachid DA COSTA, Luiz Fernando C. NASCIMENTO	143
14	Economic Valuation of Ayutthaya Historical Park, Thailand Areeya KHAMRUANG, Sakkarin NONTAPOT	153
15	Food Safety Control as a Guarantee of Consumer Protection: Institutional Component Aliesia MYTNYK, Viktoriia LATYSHEVA, Lyudmyla VASECHKO, Nataliia SHCHERBAKOVA, Nataliia SEROHINA	162
16	The Role of International Legislation in Protecting the Environment Noor ALHENDI	174
17	Achievement of Value Markers of the Harmonious Development of Agrarian Territories in the Volga Federal District in the Context of Russia's National Security Alexey Vladimirovich YASHKIN, Galina Mikhailovna ZINCHUK, Alena Igorevna ILYINA, Svetlana Vladimirovna BALANDINA	181
18	Interrelationships of Air Canal Adaptation in the Leaves of Water Lilies and Water Depth of Lebak Swamp in Kalimantan Selatan Bakti Nur ISMUHAJAROH, Didik INDRADEWA, Budiastuti KURNIASIH, Sri Nuryani Hidayah UTAMI	197
19	Analysis of Sustainable Development of SMEs and Factors Influencing to the Ecotourism Industry Dametken TUREKULOVA, Berik BEISENGALIYEV, Saltanat VALIYEVA, Nurzhamal KURMANKULOVA, Gaukhar SAIMAGAMBETOVA	211
20	Human Talent and Its Impact on the Quality of Service in the Rural Community-Based Tourism Sector. Analysis and Theoretical Perspectives Magda Francisca CEJAS MARTÍNEZ, Mercedes Carolina NAVARRO CEJAS, Silvia Marieta ALDAZ HERNÁNDEZ, Carlos Alban YÁNEZ, Derling José MENDOZA VELAZCO	223
21	Funding Research Certification Programs in the Sphere of Tourism on the Example of Developed and Developing Countries Nurkhodzha AKBULAEV	232
22	Information Accessibility of Restaurant Companies in Moravian-Silesian Region Milena BOTLÍKOVÁ, Josef BOTLÍK, Jana STUCHLÍKOVÁ	242
23	Tourist Satisfaction in Lombok Island as the World's Best Halal Tourism Destination Riduan MAS'UD, Muhammad Muhajir AMINY, Lalu Ahmad RAMADANI, Baiq ELBADRIATI, Muhamad YUSUP	252
24	COVID-19 Anchor for Cruise Tourism: An analysis of Gdańsk's and Gdynia's Cruise Tourism in the 2017-2020 Period Joanna PIOCH, Mariusz CHMIELEWSKI, Renata PŁOSKA, Karol ŚLEDZIK	264
25	Revival and Development of Tunpu Villages within the Context of Rural Revitalization in China: The Contrasting Perspectives of Cultural Heritage and Tourism Industry Heng WU, Fung Chiat LOO, Cheong Jan CHAN	273
26	The Impact of Growth in Tourism on Economic and Human Development – Incorporating a Systematic Literature Review Hoang Thi Phuong THAO, Márta BAKUCZ	287

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Journal of Environmental Management and Tourism is an interdisciplinary research journal, aimed to publish articles and original research papers that should contribute to the development of both experimental and theoretical nature in the field of Environmental Management and Tourism Sciences.

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Digitalization of Environmental Information in the Republic of Kazakhstan: Issues of Legal Regulation

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Abstract

This article considers legal regulation in the sphere of digitalizing environmental information. The study addresses the legislative consolidation of such digitalization to protect the environment and use natural resources, as well as respect human rights to access environmental information. The article is based on both general and special scientific methods. The article provides recommendations on improving the existing legislation in the field of access to environmental information and regulating the digitalization of environmental information.

Keywords: digitalization; environmental information; legislation; Republic of Kazakhstan; environment protection.

JEL Classification: O13; Q56; Q58; K32; R11.

Introduction

Today digitalization in various spheres is rising on the agenda of many countries. Scientific and technological progress and modern life conditions require the introduction of e-information. The coronavirus (COVID-19) pandemic has further pushed the digital economy and e-commerce in a new direction. The boundaries between the physical and digital world are blurring at an impressive rate. As we can see, practically all the spheres of life are digitized every day. The digitalization of environmental information is one of the priority issues in the framework of ensuring the right to access this type of information.

Currently, the Republic of Kazakhstan has taken on several obligations within the framework of national and international initiatives aimed at ensuring sustainable development, including the UN Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement. Kazakhstan is a member of the UN/ECE Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters.

A set of measures from the digital economy program is being implemented, and it is too early to state a significant increase in the efficiency of public administration in the field of environmental safety during the digitalization of the main management processes. Moreover, the latest technologies are not always introduced into the process of automating management activities. Within the framework of the above-mentioned obligations, Kazakhstan should develop new rules in economics, politics, and legislation aimed to regulate the digitalization of access to environmental information as soon as possible.

1. Methods

The research methods are modern knowledge about state and law, the doctrine about the interaction of nature and society, historical and formally logical methods, including deduction and induction, analysis and synthesis. Special methods include logical-legal, systemic and functional, as well as the methods of legal sociology.

The dialectical method serves as a fundamental general scientific method of cognizing the processes and phenomena of the objective world. The following special methods are based on it:

- The comparative-legal method was used when conducting a comparative-legal analysis of national laws of foreign states;
- The statistical method for analyzing statistical data and identifying patterns to draw conclusions and forecasts, obtain and collect information, which allows determining both the current digitalization of environmental information and its possible changes concerning the legislation of Kazakhstan with due regard to new scientific and technical challenges.

2. Literature Review

Over the past few years, the "digitalization" term has been actively used in the field of practical and scientific activities. The basis for the development of digitalization is the emergence of information technologies in the form of the Internet and mobile communications. In the context of improving economic activity, the rapid development of modern technologies served as the basis for digitalization and a change in the role of information resources from an additional to the main source in all sectors. The environment and its constituent elements require operational, reliable, and full-fledged information resources. In this regard, the digitalization and introduction of automated environmental management are of great strategic importance since results in the field of environmental protection and rational use of natural resources will depend on the accuracy and effectiveness of the presentation of environmental information.

To study the legal regulation of digitalizing environmental information, one should consider the development of this issue. Since digitalization is a fairly new concept, its legal regulation needs a clear framework.

While studying scientific developments in the field of legal regulation of the digitalization of environmental information, we should also consider scientific works in other fields. "Environment, digitalization and nuclear energy" written by the Corresponding Member of the Russian Academy of Sciences V.A. Grachev discusses the fundamentals of digitalization of the nuclear industry. It sets tasks to improve all the elements in a system implementing the environmental policy and to include them into such a system relating to the digital environmental policy. The author considered the ecology of digitalization and the digitalization of ecology as two developing concepts and two areas of activity (Grachev 2020, 35). It is worth mentioning that the regulation of environmental policy plays an important role in the digitalization of environmental information. Only the right policy can create clear legal regulation and important mechanisms for the digitalization of environmental information.

In 2004, D.C. Esty's "Environmental Protection in the Information Age" addressed the issues of pollution and natural resource management during the Information Age. The study tries to fill several information gaps and argues that new information technologies will create options for solving challenges in the field of environmental protection and expand the range of strategies for protecting the environment. The author considered such issues as remote sensing technology, modern telecommunication systems, tracking pollution flows and resource consumption, and measuring the resulting impacts. D.C. Esty (2004) believed that these developments would enable a new structure for institutional responses to environmental problems.

Teemu Meronen's thesis "Environmental Sustainability through Digitalization in Finnish Public and Private Sector Organizations" examines how various organizations in Finland use digitalization to promote sustainable

development of the environment. This work raises three main questions. Firstly, what motivates different organizations to ensure environmental sustainability. Secondly, how organizations have improved or are interested in increasing their environmental sustainability through digitalization. Thirdly, what are the differences in motivation, interests, and actions depending on the positions of respondents and organizational characteristics, such as the employer's sector or industry. The scholar considered the direct, indirect, and structural impact of digitalization on the environment. Environmental aspects include energy, materials, waste, and emissions (Meronen 2017).

This study can also be useful in the implementation of the project in the development of appropriate regulatory legal acts. As it looks at improving environmental sustainability and the benefits of digitalization. Riikka Koulu's research study "Law and Digitalization – an Agenda for the Future" (Koulu *et al.* 2017) with students explores such issues as:

- Digitalization of public services;
- International Conflict Management;
- Use of new technologies;
- Open data and access to legal information;
- Shaping the future legal profession;
- Legal technology research.

This work presents scientific developments for studying the digitalization of environmental information as a public service. The authors also proposed to use the latest technologies for access to legal information. N.V. Dulatova's "Digitalization and environmental-economic security" covers certain issues of digital technologies and the digital environment in the information system of environmental-economic security, as well as the legally justified implementation of digitization strategies. In addition, the study analyzes the development model of a green economy project to ensure the balance of social, environmental, legal, and economic components. The author concluded that it was necessary to use digital technologies for environmental safety, including reasonable violations by business entities and society as a whole (Dulatova 2020, 29).

We should also pay attention to surveys on digital law, namely, scientific developments in the framework of e-regulation and e-law, smart government, and information infrastructure. For example, there is Rónán Kennedy's "E-Regulation and the Rule of Law: Smart Government, Institutional Information Infrastructures and Fundamental Values". This work makes an important contribution by presenting a theoretical view on rationality in government and developing a values-based framework for using ICTs as a tool in state apparatus. It also examines the protection of the rule of law in digital government. In addition to e-government, the article proposes, defines, and criticizes a new area of research – "e-regulation". The use of ICTs in electronic regulation is studied since these technologies can be a support or an obstacle to the realization of a particular right. A crucial point is a conclusion that e-government research should address regulatory processes and law should be the main guideline for those who engage in such activities. When studying the digitalization of environmental information, various aspects of legal regulation should also be considered (Kennedy 2016, 77).

Joaquín Ordieres-Meré, Tomás Prieto Remón, and Jesús Rubio prepared the study entitled "Digitalization: An Opportunity for Contributing to Sustainability from Knowledge Creation".

One of the UN Sustainable Development Goals is to combat climate change, as well as to preserve marine and terrestrial ecosystems. This scientific work aims at studying the prospects for sustainable development in digital transformation. The authors analyzed two different cases: the manufacturing industry and the service sector. They analyzed various factors but mainly focused on the positive effects of knowledge creation, facilitated by the direct or indirect application of digitalization. A case-by-case analysis was carried out to identify different initiatives and their impact on environmental performance. The positive effects of the institutional sphere were also evaluated (Ordieres-Meré *et al.* 2020).

Tina Ringenson, Mattias Höjer, Anna Kramers, and Anna Viggedal (2018) in their research paper "Digitalization and Environmental Aims in Municipalities" studied the mechanisms of using digital technologies to achieve environmental goals by municipalities.

The German Parliamentary Advisory Council on Sustainable Development indicates that digital technology should be used as a tool to address social, environmental, and economic issues within political actions on the sustainable development of digitalization.

Digitalization cannot be viewed as an end in itself or a separate spectrum. Digitization fulfills thoughtful purposes. In our case, the use of digital technologies should be carefully considered taking into account their positive and negative impact on the environment, as well as compliance with the existing legal requirements.

What relation do the above-mentioned works have to the study of the legal regulation of digitalization of environmental information? Although digitalization appeared long ago, it has been implemented both in developed and developing countries quite recently. Nevertheless, it evolves at a tremendous speed. The legal regulation of digitalizing environmental information requires the in-depth research and study of scientific developments from all over the world (not only in the field of legal science). To conduct high-quality research work, it is necessary to study works in the field of ecology, economics, information technology, etc.

I.Yu. Pavlov's thesis considers theoretical and practical issues of access to official information on environmental protection. The section "The legal regulation of access as exemplified by environmental and legal information" studies legal issues in the field of contradictions and conflicts of norms governing the provision and use of environmental information. At the same time, an obstacle and an administrative barrier for searching and obtaining environmental information is the need to obtain a license for activities related to monitoring the environment and the degree of its pollution. In the following sections, the author considered the forms and methods of providing access to official information, defined and analyzed provision and dissemination as a legal form of access to environmental information, and listed the following methods of access to the sources of environmental information: the publication and disclosure of information, posting information on the Internet, posting and disseminating information in places where every interested person can get acquainted, familiarizing users with paper versions of documents, participation of citizens in public hearings and meetings of collegial and state bodies, and the timely provision of information resources upon request (Pavlov 2008).

K.V. Volkov's research presents a comparative-legal analysis of laws in Russia and foreign states in the field of the legal provision of access to environmental information, the legal regulation of the circulation of this information, the comparison of basic definitions and concepts, the procedure and basis for the generalization, collection, and analysis of environmental information resources. The thesis also presents the results of monitoring the environment and suggests the necessary changes and additions to the Russian legislation in the field of environmental information (Volkov 2009).

In Kazakhstan, P. Erezhepyzy (2018) defended a thesis on the following topic: "The legal regulation of public access to environmental information (the comparative analysis of national and foreign legislation)". The thesis is concerned with the legal regulation of public access to environmental information. The author conducted a comprehensive legal analysis of the access of citizens and public organizations to environmental information in Kazakhstan, analyzed the legal basis for ensuring, exercising, and protecting the public right to access environmental information. The scholar studied the historical formation and development of legislative regulation for obtaining the access of public organizations and citizens to environmental information based on foreign and state laws. A particular interest was shown in public hearings on environmental issues and public participation in decision-making in Kazakhstan, the legal issues of resolving environmental disputes, and forms of judicial protection of the legal rights and interests of the population and citizens in this area. Theoretical conclusions were drawn and practical recommendations were made for the subsequent development of legislation to ensure the implementation and fulfillment of the obligations of Kazakhstan on the implementation of the Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters (Erezhepyzy 2018).

N.G. Zhavoronkov and Yu.G. Shpakovsky's work "Digitalization in the field of environmental safety: administrative and legal aspects" discusses regulatory issues, as well as the introduction of modern technologies in the automated management of activities in the field of environmental safety. We believe that the implementation of comprehensive measures for the digitalization of the economy is at the initial stage, and it is too early to assert a significant increase in the efficiency of public administration in the field of ensuring environmental safety in the electronic automation of main management processes. To this moment, the state has formed a versatile and cost-effective management system that embraces the entire infrastructure – the Unified State System for the Prevention and Elimination of Emergency Situations. According to the authors, "the main task of digitalization in the field of environmental safety is to adapt the existing system of public administration to the digital environment since this is an area of increased attention, economic and social responsibility of state" (Zhavoronkova and Shpakovsky 2019, 14).

3. Results and Discussion

In the age of rapid growth of innovative technologies, digitalization plays a major role. In many areas, digitalization has improved the quality of work and life. Digitalization influences all everyday activities: transport, education, science, industry, business, finance, management, and justice. Environmental protection and ecology are no exception.

The adopted program "Digital Kazakhstan" presupposes the creation of a "Unified state system for monitoring the environment and natural resources". From the political and legal perspectives, the program will allow:

- To implement the national strategy for the sustainable development and prevention of environmental catastrophe;
- To ensure the transparency and democratization of society in the field of environmental protection and the protection of natural resources;
- To create the necessary conditions for providing open access to environmental information;
- To monitor public opinion on environmental issues.

From the economic perspective:

- To increase the efficient use of natural resources and social production, as well as improve socio-economic living conditions of the population.

From the social perspective:

- To improve health and increase the life expectancy of the population; create conditions for improving environmental culture and environmental education of the population.

The legislation of Kazakhstan does not contain the concept of "digitalization of environmental information" that is used in laws of most countries of the world. This creates difficulties in legal regulation.

The very concept of "digitalization" is quite new in law enforcement. In recent decades, the "digitalization" term has quickly gained popularity in the field of operations management in economic industries and the academic community. In general, digitalization aims at transforming information flows and data through the use of new technologies and tools. Before defining the "digitalization of environmental information", it is necessary to consider the concept of environmental information.

Modern environmental doctrine pays much attention to the study of the "environmental information" term. This is conditioned by the fact that the role of information is steadily growing at the present stage of the development of society. Human relations with the outside world are informational and mostly governed by the rule of law (Elyubaev 2017). The right of citizens to information is one of the most important human rights, which is explained by the very nature of information and the need for its possession for any civilized person (Resolution of the Government of Kazakhstan 2017). The information factor leads to the development of these social relations. The global nature and relevance of environmental protection and the use of natural resources, and the interest shown in information rights around the world predetermined the term "environmental information" (Bogolyubov 2000).

In everyday life, the concept of "environmental information" is interpreted exclusively as information about the "environment". However, the Aarhus Convention provides a broader definition of "environmental information" than just "information on the environment" (Convention on access to information 1998). Clause 3 of Article 2 of the Aarhus Convention defines "environmental information", which includes three main components – the first describes possible elements of environmental information, the second is about the elements of the environment, and the third is about the factors affecting these elements and the state of safety. In our opinion, the definition proposed in the Convention is quite universal, and most importantly, it covers the entire spectrum of public relations in the field of interaction between society and the environment (Convention on access to information 1998).

Article 2.3 of the Aarhus Convention establishes a binding standard for the definition of "environmental information". A party to the Convention (a state that has signed and ratified it) has the right to consolidate a broader and more detailed concept of "environmental information" in a national regulatory act. An indispensable obligation of a Party to the Convention is the obligation not to formulate this concept in national acts more narrowly than provided for in the Convention.

According to Article 159 of the Environmental Code of Kazakhstan, environmental information "includes information and data about the state of the environment and its objects" (The Code of the Republic of Kazakhstan 2021) and *provides a list of such information*. However, the Environmental Code of Kazakhstan does not properly define "environmental information". In our opinion, the effective implementation of legislative prescriptions depends on a competent definition, therefore it is necessary to define the "environmental information" term (The Code of the Republic of Kazakhstan 2021).

The lack of a unified concept of environmental information causes different interpretations of the same laws and leads to different, sometimes opposite legal solutions in resolving the issue of obtaining environmental information and protecting the violated right in case of failure to provide such information (Yerezhpekyzy and Tynybekov 2013, 167).

Environmental information has typical features that should be taken into account when collecting data and information, storing and processing it. The recipient of environmental information pays attention to the quality of data, its time period, technical and thematic features, availability, content, reliability, openness, necessity, etc.

Article 3.3 of the Aarhus Convention provides a detailed list of those types of information referred to as "environmental information". However, the Convention does not formulate an exhaustive list and only describes the information that should be regarded as "environmental information".

The legislation of Kazakhstan is developing in the direction of providing access to environmental information. On April 8, 2016, major provisions were introduced into the Environmental Code of Kazakhstan. For example, Article 161 specifies what is included in the state fund of environmental information, *i.e.* the list of environmental information compiled by the state (The Code of the Republic of Kazakhstan 2021).

Along with this innovation, the National Report on the State of the Environment and the Use of Natural Resources of Kazakhstan was adopted (Resolution of the Government of Kazakhstan 2016) is published annually.

– Digitization is the transformation of information "from physical media to digital" (Koptelov 2016). Within the framework of digitization, there is no change in the quality and content of information, it is simply converted into electronic form for subsequent processing in a digital format, which allows improving the existing business processes by adding digital data to them.

Yu.I. Griбанov (2019) described digitalization as a process aimed at digitizing all information (and even material) resources and forming network interaction platforms to obtain a predictable and guaranteed result for any control action using automation tools.

The digitalization of environmental information implies a wide range of methods and tools that can be used to improve the environment and environmental management, for instance, the collection and exchange of environmental data, environmental monitoring, and control of problematic activities.

The digitalization of environmental information can be viewed in both a broad and narrow sense.

In a broad sense, the digitalization of environmental information means the transformation of information about the state of environmental elements, such as air and atmosphere, water, soil, land, landscape, and natural objects, biological diversity, and its components.

In a narrow sense, the digitalization of environmental information is understood as the provision of access to environmental information through a unified information system for environmental protection developed by the state.

In our opinion, environmental digitalization will contribute to the following improvements:

- To protect endangered plant and animal species;
- To reduce CO₂ and other greenhouse gas emissions;
- To cut the costs of human resources (through the use of drones and other technical means);
- To eliminate and reduce drought, etc.

Many foreign companies are working on the digitalization of ecology to reduce emissions, protect the environment and ensure energy efficiency. For example, the Spanish Association for Digitalization DigitalES represents the main digital companies in Spain and the new innovative industry. Its goal is to contribute to the development of digital technologies and transformation of citizens, companies, and public authorities, thereby contributing to economic and social growth, as well as the environmental sustainability of society.

Technology and continuous innovation are an inexhaustible source of benefits for sustainable development. To digitalize environmental information, a solid legislative base is required, ensuring compliance with environmental legislation and creating the most favorable environmental policy.

The introduction of new technologies for collecting and processing data will provide environmentally relevant information about potentially harmful behavior. This will allow developing new environmental monitoring standards. The emergence of advanced sensor technologies has created a unique opportunity to digitize environmental information (Liu *et al.* 2019).

For example, the European Union explores the use and potential of remote sensing to monitor sites and areas where environmental offenses have occurred.

DIRECTIVE (EU) 2019/1024 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 June 2019 on open data and the reuse of public sector information states the following for the legislation of member states of the EU:

The public sector in the Member States collects, produces, reproduces, and disseminates a wide range of information in many areas of activity, such as social, political, economic, legal, geographical, environmental, meteorological, seismic, touristic, business, patent-related and educational areas. Documents produced by public

sector bodies of the executive, legislature, or judiciary constitute a vast, diverse, and valuable pool of resources that can benefit society. Providing that information, which includes dynamic data, in a commonly used electronic format allows citizens and legal entities to find new ways to use them and create new, innovative products and services. Member States and public sector bodies may be able to benefit from and receive adequate financial support from relevant Union funds and programs, ensuring a wide use of digital technologies or the digital transformation of public administrations and public services, in their efforts to make data easily available for re-use.

In 2019, the EU took a huge step towards digitalizing information, including environmental information. The new rules make the EU member states implement the digital transformation of public administration.

In addition, an important step in this document is that environmental information, in particular documents in the field of the environment, is referred to as "high-value datasets". They classify this information as reusable information. This means that individuals or legal entities use documents belonging to:

a) Public sector bodies for commercial or non-commercial purposes other than the original purpose within the framework of the public task for which the documents were prepared, except for the exchange of documents between public sector bodies solely for the fulfillment of their public tasks;

b) State-owned enterprises for commercial or non-commercial purposes, other than the original purpose of providing services in the general interest for which documents were prepared, except for the exchange of documents between state enterprises and public sector bodies solely for the fulfillment of government tasks of public sector bodies (Directive (EU) 2019/1024 of the European Parliament and the Council 2019).

In our opinion, this means that the environmental information obtained for any purpose was not intended to be used for the benefit of society.

Here are some examples of the effective digitalization of environmental information and its legislative implementation.

The Norwegian government uses drones to take orthophotos of swamps to reverse the drainage of wetlands. The terrain model based on drone imagery is used by the Norwegian Environment Agency to plan wetland restoration and can be helpful for the long-term monitoring of wetlands (Næss 2018).

The environmental data provided by industrial plants, such as the European Pollutant Release and Transfer Register (E-PRTR), give a better understanding of the processes harmful to the environment.

The US Environmental Protection Agency developed the EJSCREEN, a digital screening tool that displays environmental and demographic performance. It reveals overlaps between areas with high levels of contamination and areas of vulnerable populations. The EJSCREEN has become publicly available, enabling state agencies and local self-governments to better integrate such information into politics (OECD 2018).

Another example is the UK that set up online systems to change, transfer or revoke environmental permits.

Big data and artificial intelligence algorithms can be used to monitor and protect endangered species on land, as well as an early warning about natural disasters such as earthquakes, wildfires, floods, and droughts.

The EU strengthens its digital and environmental policies. It emphasizes that the EU Commission "will examine measures that enable digital technologies such as artificial intelligence, 5G, cloud and edge computing, and the Internet of Things (IoT), to protect the environment and accelerate and maximize the fight against climate change" (Digital Watch n.d.).

The digitalization of environmental information will facilitate the display and dissemination of information about the state of the environment or other data in the field of ecology and thereby contribute to transparency and confidence in the decisions of state bodies in the field of environmental protection and the use of natural resources. Blockchain technology allows verifying submitted environmental data. Accordingly, blockchain can also increase public and regulatory participation. During the verification process, this will allow interested parties to request and receive environmental data and information. In practice, this means that environmental organizations will be able to carry out their audits based on the data provided.

Indeed, many countries have made progress in the digitalization of environmental information. At the legislative level, it is necessary to introduce an algorithm for the digitalization of environmental information, which will allow the gradual and phased use of the latest technologies for the digitization of data in the field of the environment and the use of natural resources, as well as the creation of applications for the wide dissemination of such data. In addition, these applications and other digital sources will display the regular information about the state of the environment received by government agencies.

To increase the efficiency of state environmental monitoring and organization, many bodies collect and process unified data (that meets modern requirements in the field of information and telecommunication technologies) using their information resources, often not related.

The new Environmental Code of Kazakhstan assumes as follows:

- To adopt provisions of the Aarhus Conventions;
- To integrate all the existing types of state control into a single functional system, update the list of information on the environment, natural resources, and specific types of monitoring, define the necessary competences and mechanisms for the interaction of all competent state bodies and other stakeholders to create a unified information system;
- To lay a legal basis for the creation of the necessary standards and mechanisms for the functioning of a unified database (bank) of environmental information, including "The State Register of Industrial and Domestic Wastes", "The State Register of Discharges of Hazardous Substances, Radioactive Wastes, and Waste Water", "The State Inventory of Sources of Absorption of Greenhouse Gases", etc.;
- To expand the list of the necessary information on the collection, transportation, disposal, and processing of industrial and household waste with due regard to the best international experience and the introduction of a working economy in the field of industrial and consumer waste management;
- To form the principles of information disclosure and information exchange within the system.

To ensure the environmental safety of Kazakhstan and determine a set of state measures for the sustainable environmental development of the country, new regulations were adopted "On the Concept of Environmental Safety of Kazakhstan for 2004-2015" and "On the Concept on Transition of Kazakhstan to Sustainable Development for 2007-2024". Both of them expired in 2011.

President N.A. Nazarbayev initiated and signed the "Concept on Transition towards Green Economy" on May 30, 2013. First of all, this concept presents a list of priority tasks, mainly aimed at reforming certain sectors of the economy (Decree of the President of Kazakhstan 2013).

"The Concept on Transition towards Green Economy" lays the foundation for deep systemic transformations and adoption of a newly formed economy by increasing the welfare and quality of the population of Kazakhstan. It is among the 30 most developed countries in the world, but it also reduces the pressure on the environment and the degradation of natural resources.

The green economy concept does not replace the concept of sustainable development but recognizes the achievement of stability and is based on the observance of economic and environmental laws (Dulatova 2020, 30).

Some shortcomings of economic ideology are incompatible with the concept of sustainable development. Thus, proper green economy policies are required to ensure shared social, environmental, legal, and economic components.

Unfortunately, "the Concept of Transition to Green Economy" does not contain a section on the digitization of environmental information.

The digitalization of environmental information requires the introduction of a new algorithm at the legislative level that will allow the gradual and phased use of the latest technologies for the digitization of data in the field of the environment and the use of natural resources, as well as the creation of applications for the dissemination of this data for widespread use. In addition, these applications and other digital sources will display regular information on the state of the environment received by government agencies, which will further strengthen the exercise of rights to a healthy environment and to access environmental information.

All the economic sectors of Kazakhstan undergo the digitalization of environmental activities: from the digitization of all initial data and their automatic reading directly from the equipment of emissions, discharges, and waste, to the complete digitalization of control and supervision activities.

It is necessary to digitize cross-sectoral control measures, improve and digitize the system of environmental indicators. All sectors of the economy face the same challenges both in Kazakhstan and in the world.

Currently, Kazakhstan is actively investing in the digital economy. However, the introduction of digital innovations causes new problems. This should also be included in the concept.

The basic principles of the digitalization of environmental information are as follows:

- To provide access to environmental information and involve the population in solving environmental issues;
- To update the economy using the most efficient digitalization technologies;
- The principle of an innovative ecosystem approach;

▪ To create an automated system for monitoring large pollutant emissions into the environment. The quality of government activities in this area depends not only on a particular person but also on the level of automation and optimization of government services for the provision of environmental information.

Table 1. The SWOT analysis of the digitalization of environmental information

Advantages	Shortcomings
The access of the population to environmental information	Concerning cybersecurity, national legislation is not fully regulated, and the security of government information resources is not properly ensured
The maintenance and effective management of ecosystems	The technical ignorance of the population
Digitalization reduces the number of paper documents by storing data in electronic format	The electronic storage of environmental data puts them at risk of loss due to technical failures
This will help prepare a qualified workforce and entail significant financial costs for digital services	
Opportunities	Challenges
Raising the public awareness and transparency of government agencies when state posts the results of its work on the Internet in a form convenient for its citizens	The lack of resources
Environmental information is provided free of charge	The lack of Internet access in rural communities

Within the framework of this direction, the state program "Digital Kazakhstan" plans to integrate all the processes and systems of state bodies and exclude paper documents and certificates to improve the quality of public services, including the creation of a "Unified state system for monitoring the environment and natural resources" (Electronic government and public services n.d.). At the meeting of the Parties to the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters of the Economic Commission for Europe, a representative of the UNEP assessed the potential for transforming public administration in the conditions of a new digital environment. They provide a real opportunity to solve complex issues of different economic sectors. For instance, they highlighted four problems that need to be solved as soon as possible. Firstly, the management of data should be improved to make it less fragmentary and unstructured, as well as their quality less volatile. Secondly, greater collaboration between the public and private sectors is required to transform data into knowledge that can influence economic incentives and behavioral patterns, in which access to product information can be important. Thirdly, there is a need to address the digital divide and increase digital literacy. Fourthly, it is necessary to ensure that digital transformations are carried out by government bodies performing environmental functions and providing similar services. These problems are inherent in modern conditions and should be solved in due measure, which emphasizes the relevance of the transformation of public administration in the age of new information technologies.

As noted above, Kazakhstan has embarked on a course towards a transition to a new model of public administration, which is based on the principles of a "hearing", effective, accountable, professional, and pragmatic state. The implementation of the proposed concept is based on solving several key tasks, including such areas as the formation of a client-focused and open state apparatus. Within the framework of this approach, the following activities are planned: "the creation of the necessary conditions for unimpeded access to information should become the key task not only of the authorized body but also of every civil servant. It is necessary to increase the availability of open data contained in the online information systems of state bodies. It is required to develop and apply the standards of openness to all the activities of state bodies". The formation of an optimal and efficient state apparatus is one of the tasks of the new concept, which aims at automating the business processes of state bodies. The implementation of the project approach in public administration was enshrined in the legislation on administrative procedures, in particular Article 43-1 of the Administrative Procedure Code of the Republic of Kazakhstan (The Code of the Republic of Kazakhstan 2020).

While developing the idea of introducing project management, the following legal principles were consolidated: relevance, concreteness, measurability, achievability, and time-limited goals; clarity in the definition of project roles and personal responsibility; a combination of rigidity in execution and flexibility in responding to internal and external changes; clear planning, excluding the duplication of goals, results, and content, determining resources, sequence, and boundaries of portfolios, programs, and projects; the development of project management based on the best practices (Resolution of the Government of Kazakhstan 2021). We believe that the transition from operational personnel management to strategic management will contribute to the professionalization of the existing state apparatus.

We support the opinion of analysts that the above-mentioned issues can be solved in the following way. Firstly, a digital ecosystem of environmental information should be created, for which it is necessary to integrate environmental data, analytics, and norms to inform and transform the main components of the digital economy, for example, e-commerce. There are no ready-made answers to the question of what is the digital ecosystem of environmental information. According to experts, the innovation ecosystem of any country consists of closely related subsystems embracing the state, the business, and the environment that produces knowledge and knowledge transfer mechanisms (Proskurnin 2017, 6).

As practice shows, the driving force in the development of innovation ecosystems is the state. On the one hand, it creates organizational and legal conditions for the development of this innovation ecosystem. On the other hand, it acts as a regulator between the business and the environment that produces knowledge and knowledge transfer mechanisms. Kazakhstan has set itself ambitious goals and objectives. The country strives to become the center of innovative knowledge and mechanisms for its global transfer and take the leading position among the countries of Central Asia.

However, special attention should be paid to increasing digital literacy and public participation in digital transformation and supporting e-government applications for public participation and citizen science. Using the experience of Belarus, Kazakhstan can learn how to develop a long-term action plan in the field of digital technologies. This approach is acceptable for the development of e-government and open data systems. It can ensure analysis, management, and funding for national e-government and open data portals, as well as implement digital awareness activities for both government agencies and the population. At the same time, all the available results and best practices gained from previous initiatives and economic projects should be evaluated and put into action. We see the general structure of interaction as follows. A structure for interaction should be created in Kazakhstan, or at least its foundation should be laid. This is especially necessary to create an integrated environmental information system and to ensure the smooth integration and exchange of environmental data. An open data and environmental information roadmap should contain the key objectives to facilitate the exchange and dissemination of environmental information.

- Legal measures: law enforcement mechanisms for the regular collection, exchange, and dissemination of environmental information, as well as for monitoring their implementation.

- Technical measures: e-government, open data, and eco-portals: the country should have effective e-government, open data, and environmental portals where environmental data and spatial data can be exchanged/disseminated and where services can be created. As practice shows, the state regulation of relations in the field of access to environmental information does not always consider the necessary criteria to ensure sustainable economic and social development, which is possible through the cooperation of the structures involved. In this connection, we would like to dwell on the experience of some foreign countries. For example, Lithuania has a digital strategy that addresses environmental issues. Ireland has a national open data strategy and action plan for its implementation for specific types of information. The EU member states took the path of creating electronic services and public information systems in accordance with national and international standards and adapting their open data policy and applying it to environmental data. The UK and Romania post e-services on a special Internet portal (European Environment Agency 2020).

Conclusion

Today the digitalization of the ecological sphere in Kazakhstan ensures its economic growth and competitiveness on the world stage. Digitalization can become the engine of the national economy and the generator of permanent jobs. The state program "Digital Kazakhstan" provides for the creation of "a unified state system for monitoring the environment and natural resources". In addition, the National Strategy for the sustainable development and prevention of environmental disasters, the implementation of transparent processes in the field of environmental protection, monitoring public opinion of the population on environmental issues, the efficient use of natural resources, improving the health of the population and increasing life expectancy aim at increasing the environmental culture and environmental education of the population.

In general, the state is the main driver of digitalization. Without its active participation, it is impossible to provide an effective solution to technological issues, including the creation of platforms that form a "digital picture" of the modern economy. The state regulation of relations in the field of access to environmental information is the activity of state bodies to create legal, economic, social, organizational, and other conditions aimed at fulfilling international obligations to ensure public access to available environmental information. Kazakh legislation specifies who can be the owner of environmental information. Thus, it recognizes all branches of government, including representative and executive authorities. Along with them, state organizations and subjects of the quasi-

public sector, whose activities are related to the environment, are recognized as carriers of information. The object of these legal relations is environmental information, whose owners are state bodies, state institutions, individuals, and legal entities.

In the context of digitalization, Kazakhstan has embarked on a course towards creating a new model of public administration (the "person-centered" model), which is "directly related to providing access to environmental information and effective activities of the state in this area". Information about the environment, the quality and quantity of its components, and the existing changes depends on the health and standard of human life.

Kazakhstan plans to create a digital ecosystem of environmental information in the format of a "unified state system for monitoring the environment and natural resources" that does not have legal regulation. In this regard, it is necessary to develop a special program of environmental digitalization to determine its main goals and objectives, which will directly contribute to the exchange and dissemination of environmental information. To attain this end, it is proposed to solve a range of legal issues, in particular, to organize procedures for the constant exchange of environmental information and monitor the implementation of these tasks. The study of legal documents has revealed that the Government of Kazakhstan adopted the Resolution "On approving the Rules for organizing and conducting a unified state system for monitoring the environment and natural resources" in 2001, which became invalid in 2008.

The reasons for its failure are unknown. If this document had been successfully implemented, many problems with access to complete and timely information would have been resolved. In the program "Digital Kazakhstan", the digitalization of environmental protection and the use of natural resources are not addressed. The overall strategy proposed by this document does not stand up to criticism. In this regard, we recommend developing a digital strategy for open data and implementing it for specific types of environmental information. Within the framework of project management, the effectiveness of state programs should be questioned since their implementation requires billions of dollars. The next level is organizational. As practice shows, the Kazakh regulation of these relations lacks a clear coordinated system for the exchange and dissemination of environmental information. The strategy we proposed should cover the interaction of all holders of environmental information, as well as forms and methods of their cooperation. The country should operate effective e-government, open data, and environmental portals where it is possible to exchange/disseminate environmental data and spatial data and create services.

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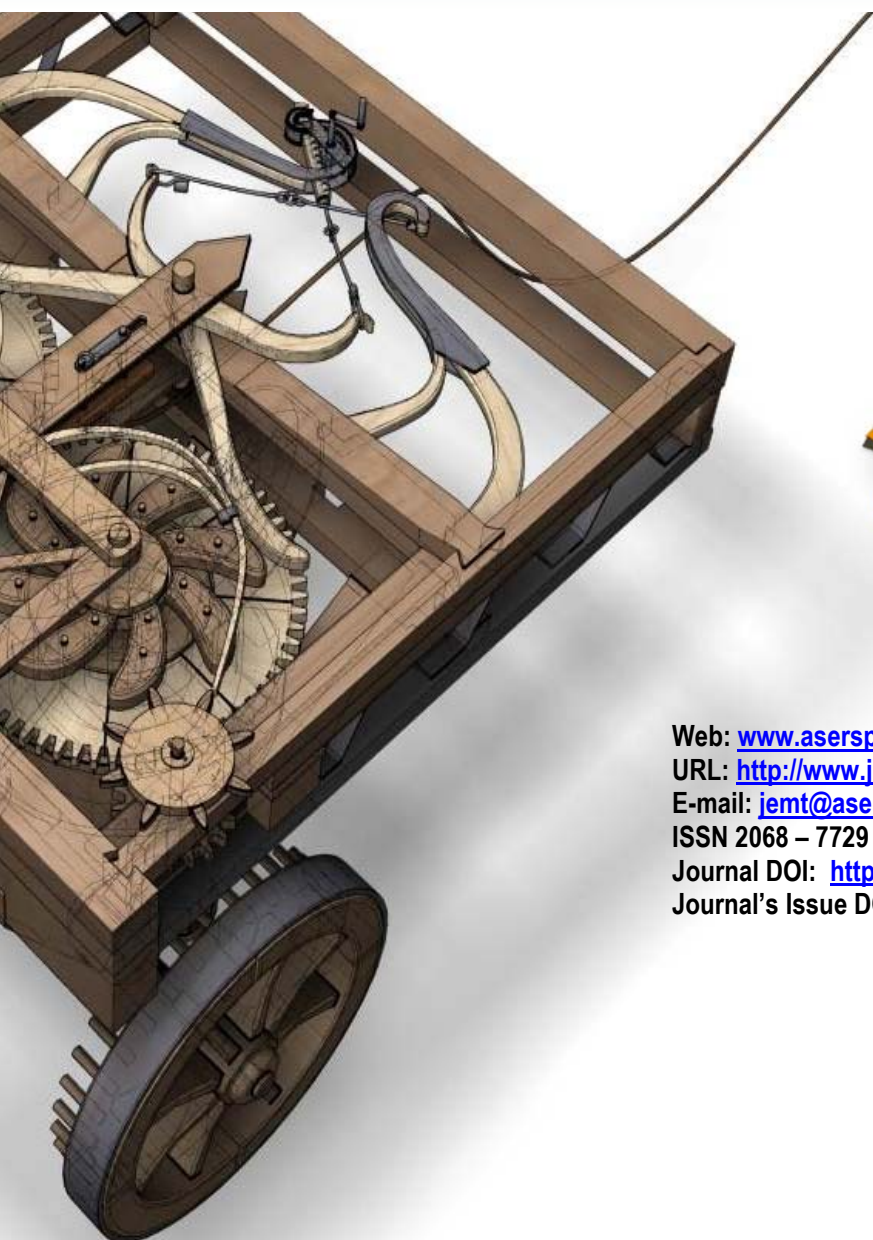
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