Regulation of environmental safety of the Kyrgyz republic

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Abstract. This article highlights the legal issues that regulate environmental safety, in particular emissions into the atmosphere in the independent sovereign Kyrgyz Republic. Various kinds of substances enter the atmosphere due to human activity. It is worth noting that these substances can be of both natural and anthropogenic origin. The harm from emissions into the atmosphere is very diverse and has a negative impact on human health, the ecological system and the climate. We attempt to provide a comprehensive analysis of the state of legal regulation of environmental safety in the Kyrgyz Republic with an emphasis on emissions into the atmosphere as a vital clean air shell of the Earth, and propose concrete steps to improve the situation in the country. Keywords: atmosphere, smog, pollution, climate change, ecological system, law, Constitution.

1 Introduction

In modern life, unfortunately, we encounter harm to our common home – planet Earth, these are various types of emissions into the atmosphere. Every resident understands that it is the atmosphere – the clean shell of our planet that plays a key role in maintaining life expectancy on our Earth, the state of the atmosphere affects the climate, human health and the ecological system.

According to data from the World Health Organization's website, over 4 million individuals perish annually due to illnesses linked to air pollution.

The presence of pollutants in the air can lead to a range of respiratory ailments, including chronic obstructive pulmonary disease, asthma, bronchitis, and emphysema, along with increasing the risk of cardiovascular conditions.

Regrettably, lung cancer and various other types of cancer have a tendency to develop over time. Children, with their rapid breathing and developing organs, are especially at risk of being affected by exposure to polluted air.

The harmful effects of air pollution include not only fatalities in infants and children but also the onset of numerous illnesses and a decline in overall well-being.

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When looking at the health of individuals who are sick, it is important to recognize that illnesses resulting from air pollution can result in various economic burdens, including lost productivity, expenses for medical treatment, and other related costs.

Treating health issues can be financially draining as medications come at a high cost. Patients must budget for medical care, prescriptions, extended treatment, and rehabilitation services.

Individuals who are sick are impacted by long-term illnesses resulting from air pollution, leading to restrictions in their ability to work and engage in social activities, ultimately impacting the economy.

The primary focus of national industrial and environmental initiatives is the reduction of air pollution through addressing financial challenges. By collaborating effectively, government entities and private organizations can implement strategies to decrease harmful emissions released into the air.

This research aims to explore the legal challenges surrounding emission regulation in the Kyrgyz Republic, focusing on constitutional and medical considerations. The goal is to identify and recommend effective strategies for enhancing environmental protection in the country.

The primary goal was to not just lower emissions released into the air, but also effectively control them. The global community has chosen to focus on creating and applying cutting-edge technologies and inventive strategies in order to minimize the effects on the atmosphere and mitigate harmful environmental outcomes.

In 2018, a detailed analysis was conducted by the Agency for Hydrometeorology within the Ministry of Emergency Situations of the Kyrgyz Republic to identify the sources of air pollution in the cities of Bishkek and Osh. The report specifically focused on determining the extent of pollution in these urban areas.

According to official data, the Kyrgyz Republic has an average PM2.5 concentration in 2022 that exceeds the World Health Organization's recommended annual air quality levels by a factor of 6.2.

During the winter months, as people rely on coal for heating, air pollution levels rise significantly. Bishkek, the capital of the Kyrgyz Republic, ranks among the top five cities with the highest levels of air pollution during this time.

According to a recent report from the UN Expert Commission, over 70% of households in the private sector rely on coal for heating, resulting in alarming levels of PM2.5 particles. These microparticles have the potential to infiltrate the human bloodstream, posing significant health risks and potentially leading to severe illnesses.

The UN reported that in 2019, over 5,800 children and adolescents lost their lives due to air pollution in 52 countries across Europe and Central Asia. Many more young people are experiencing the harmful effects of air pollution, such as illnesses, hospitalizations, and disabilities, putting their health and development at risk."

According to specialists, the release of pollutants into the air due to coal burning for heating homes has been identified as a significant contributor to air pollution.

The primary components include solid particles (PM), sulfur oxides (SOx), nitrogen oxides (NOx), hydrocarbons, and other pollutants. Solid PM particles are released into the atmosphere through coal combustion.

It is important to emphasize that these particles are incredibly tiny when inhaled, posing serious health risks for humans. Coal often contains sulfur, which can lead to the creation of sulfur oxides like sulfur dioxide (SO2) during combustion. This in turn has detrimental effects on human health.

Upon entering the atmosphere, the air undergoes a transformation that results in the creation of acid rain.

The combustion of coal can result in the creation of nitrogen oxides (NOx), which can lead to the development of smog and have detrimental impacts on both human health and the environment when released into the atmosphere.

To minimize the detrimental effects of coal on both the environment and human well-being, a comprehensive list of strategies can be devised:

- Maximizing the effectiveness of heating systems.
- Utilizing filtration systems for emissions control as a case study;
- Maximizing the utilization of clean energy sources such as natural gas, electricity, and renewable sources for increased efficiency.

Many nations are now exploring the legal implications of controlling emissions released into the air. One major focus is on establishing regulations and standards for emissions from heating systems to mitigate their environmental effects.

2 Material and Methods of Research

In this research, we selected informational materials for the study, including articles and scientific publications by leading scientists. We focused on conducting interviews and surveys among the population. We used the observation method to establish causal relationships. We used the documentary method, i.e. we studied and analyzed complex phenomena for a better understanding of the existing problem. When modeling, we tried to create our own vision of solving the problem in the format of a Concept of «Clean Air» in the Kyrgyz Republic.

3 The concept of "clean air" in the Kyrgyz republic

The Kyrgyz Republic, a sovereign nation, is actively involved in the pursuit of the 17 Sustainable Development Goals established by the United Nations in September 2015. These ambitious objectives are designed to address worldwide challenges and promote sustainable growth by the year 2030.

Every established objective consists of smaller, more specific targets, and highlights key elements in enhancing the overall well-being of the planet.

3.1 Why is it necessary to develop the concept of «Clean air»?

This idea focuses on the goal of establishing and preserving a sustainable and eco-conscious environment on our planet. At its core, the concept recognizes the significance of fresh air in promoting human well-being, preserving biodiversity, and ensuring the long-term health of ecosystems.

It is well understood that maintaining a pristine natural environment, particularly with regard to air quality, is essential. The Earth's development and human activity have resulted in the formation of the atmosphere, a complex blend of gases and aerosols in the outermost layer of our planet.

We recommend highlighting the fundamental principles and objectives.

- In order to minimize the release of pollutants, it is essential to create and utilize technologies focused on decreasing the emissions of harmful gases, particles, and toxic substances from industrial waste, transportation exhaust, and energy sources used in households.
- Enforcing a series of measures to improve urban air quality, ensuring compliance with stringent urban air quality regulations. Establishing eco-friendly zones within cities

and adopting green transportation technologies for city streets can effectively contribute to this goal.

- Advocating for and utilizing renewable energy sources is crucial. Transitioning towards high-quality renewable energy sources like solar, wind, and hydropower is essential in decreasing harmful emissions of greenhouse gases and pollutants commonly linked to energy production.
- The issue of efficient waste management and industrial processes remains a topic of debate as efforts are made to establish strategies for the gathering, treatment, and elimination of waste in order to avoid the emission of harmful substances when they are burned.
- Hosting educational workshops and sharing knowledge on environmental issues. They are dedicated to promoting education and raising awareness about the impacts of air pollution on health. Their focus is on the environment, climate change, and strategies to mitigate harmful effects.

Collaboration on a global scale is crucial when it comes to addressing air pollution issues. This involves actively engaging in international initiatives and adhering to agreements and protocols aimed at enhancing air quality worldwide.

As previously mentioned, the presence of clean air on our planet is not just important for human well-being, but also plays a crucial role in promoting the sustainable growth and balance of natural ecosystems.

In order to bring the Clean Air concept to life, it is essential for governments, businesses, and individuals to work together in a collaborative effort to protect our natural resources and create a healthy environment for all living beings on our planet.

4 Actions to ensure termination emissions into the atmosphere

The researchers in this study suggest a series of steps to prevent the buildup of pollutants in the atmosphere.

1. Enforcement of laws pertaining to environmental protection.
2. Setting limits.
3. Regularly monitoring emissions and evaluating their environmental impact is essential.
4. Development of protocols for the issuance of licenses.
5. Arrangement of the penalty structure.
6. The act of crafting and refining laws through preparation and development.
7. Introduction to purification technologies and the minimization of emissions.
8. Methods to guarantee the prevention of releasing pollutants into the air
9. Establishing and nurturing urban green spaces.

The initial step involves addressing the essential actions required, which includes the regulation of legal matters. Primarily, this involves the Constitution of the Kyrgyz Republic, serving as the fundamental legislation ensuring citizens' rights to a healthy environment and well-being.

A well-functioning legal framework must maintain a harmonious balance between safeguarding the environment, promoting public health, and establishing accountability for any breaches.

Law enforcement plays a crucial role in upholding the rights and freedoms outlined in the laws that govern the environment.

It is important to highlight the key legislative and regulatory laws in effect within the boundaries of the Kyrgyz Republic.

1. The Kyrgyz Republic's Constitution
2. The Administrative Responsibility Code in Kyrgyzstan.

3. The legal statutes of the Kyrgyz Republic pertaining to criminal offenses.
4. Legislation in the Kyrgyz Republic concerning the preservation of clean air quality.
5. Legislation concerning Environmental Protection in the Kyrgyz Republic.

The second set of actions setting emission limits for different pollutants in the air is the process of establishing standards that are typically sanctioned at the state or regional level and are commonly incorporated into specific regulatory guidelines.

Researchers have found that the process of establishing emission caps for different pollutants released into the atmosphere is intricate and involves multiple steps, such as conducting scientific studies, conducting environmental evaluations, engaging with various stakeholders, and drafting new laws.

Researchers from various scientific fields, including ecologists, chemists, and biologists, collaborate to investigate the impact of different pollutants on both the environment and human health. Their research includes analyzing current levels of air pollution and predicting potential outcomes. All significant studies are closely monitored for accuracy and relevance.

Consequently, establishing air quality standards to regulate the maximum allowable levels of different pollutants in the atmosphere is achievable. Government agencies conduct evaluations to assess the effects on both the environment and human health across different emission levels. This process helps in setting limits on the concentrations of pollutants in the air to ensure better air quality.

Block 3 Block 3 encompasses a variety of measures that utilize cutting-edge technologies to monitor emissions and evaluate their effects on air quality, climate, and other aspects of the environment.

Various contemporary technologies are employed to gauge emissions and evaluate their influence on air quality, climate, and other environmental factors.

Automated surveillance technology is now prevalent in today's society. These sophisticated systems utilize automated sensors to constantly track the release of a wide range of dangerous pollutants.

These systems have the capability to offer tangible, real-world data that accurately reflects the quantity of pollutants being released.

Recent advancements in engineering have revolutionized the way atmospheric phenomena are studied, allowing for a closer examination of processes such as drones.

Utilizing drones for aerosol sampling and data gathering in remote or hazardous locations is gaining widespread popularity and significance.

The drones come with a range of sensors, including those for detecting different gases in the atmosphere. They can be deployed to track emissions from factories, power plants, vehicles, and other sources of pollution, providing precise data for analysis. utilizing drones for monitoring emissions from various sources such as industrial plants, power plants, and transportation can provide precise measurements and analysis of pollution levels.

Drones have the ability to navigate through tall structures such as pipes and skyscrapers, allowing them to capture gas emissions being released into the atmosphere.

Utilizing data collected by drones enables the creation of detailed three-dimensional maps depicting gas emissions in the physical environment, where internet-connected sensors and devices are commonly utilized. Drones offer a versatile and effective method for monitoring and tracking emissions, aiding in the formulation of precise strategies to combat air pollution.

Another cutting-edge method involves utilizing computer models and simulations to forecast the dispersion of pollutants and their consequences on the surrounding ecosystem. This allows for the execution of virtual experiments and examination of different potential outcomes[1-15].

The latest advancements in technology offer improved, precise, and readily available means for tracking and assessing atmospheric emissions. This aids in better managing and minimizing harmful environmental effects.

There is a widespread belief that promoting the advancement and adoption of eco-friendly technologies and cutting-edge innovations can play a crucial role in facilitating the shift towards renewable energy sources, enhancing energy efficiency, and utilizing effective emission control techniques.

4 block each business, based on its operational activities that release a variety of emissions into the air, is required to possess a unique set of permits.

If companies exceed certain limits, they may face administrative and financial sanctions, as well as scrutiny of their oversight processes. Businesses emitting pollutants into the air typically require specific permits and must regularly check to ensure they are meeting industry regulations.

Granting emission permits to businesses that comply with specified standards and criteria. Licensing processes invariably encompass stipulations and durations of effectiveness.

Block 5 penalties are a method of enforcing consequences for businesses that break permit conditions or surpass emission restrictions, through the establishment of a fine system.

Implementing consequences for breaches of environmental safety regulations involves the imposition of penalties, legal accountability, and potential criminal charges for egregious offenses.

If government agencies and businesses fail to meet environmental regulations, resulting in increased pollution, they should be held accountable by facing stricter consequences such as higher taxes and fines.

In the end, these actions encourage the reduction of emissions and the adoption of cleaner technologies. Companies that consistently adhere to environmental regulations and incorporate sustainable practices may benefit from tax breaks, subsidies, or other financial incentives, promoting the use of eco-friendly methods in their operations.

Block 6 legislation plays a crucial role in shaping environmental protection policies by establishing guidelines and regulations for emissions from businesses. Government agencies, like the Environmental and Technical Supervision Service of the Kyrgyz Republic, oversee the process of developing procedures and requirements for companies seeking emission permits.

As per the protocol, businesses are required to submit applications and disclose details regarding anticipated emissions, efforts to minimize pollution, and more. The regulations on environmental protection aim to establish harmony between societal demands and the preservation of resources for future generations, promoting sustainable interaction between humans and the environment.

The efficiency of the regulatory framework relies on the rigor of laws, their adherence, and the oversight by relevant authorities. Currently, the Jogorku Kenesh, the legislative body of the Kyrgyz Republic, is deliberating two proposed laws. One pertains to amendments to the existing Law on Atmospheric Air Protection, drafted by the Cabinet of Ministers of the Kyrgyz Republic.

Block 7 the introduction of cutting-edge scientific advancements into the realm of wastewater treatment and emissions reduction is revolutionizing the way enterprises and plants operate. In order to minimize their impact on the environment, businesses are now required to incorporate state-of-the-art technologies and equipment such as filters, catalysts, advanced waste disposal systems, and various other cleaning techniques to effectively reduce emissions released into the atmosphere.

Substituting fossil fuels with sustainable energy sources like solar, wind, or hydropower can lead to a substantial decrease in greenhouse gas emissions, promoting a more eco-friendly approach to energy production.

The state has implemented stringent emission regulations and the authority to levy fines on companies that fail to meet environmental standards, potentially incentivizing businesses to enhance their environmental practices. Additionally, many households now have the option to transition to renewable energy sources.

Block 8 implementing mechanisms to ensure the reduction of emissions released into the atmosphere is vital. This can be done on a global scale as well as at the regional level. Governments establish guidelines and rules for the release of different pollutants based on specific codes and regulations.

Businesses and other polluting entities are required to adhere to established regulations, which may eventually be enforced through laws and penalties for non-compliance. With the implementation of a quota trading system, every company, represented by its director, has the ability to purchase emissions permits.

This system will provide a financial motivation for businesses to lower their emissions, allowing them to purchase or sell extra quotas to other organizations that are not in compliance with environmental regulations.

The government can offer financial support like grants, funding for research, and tax breaks to companies that adopt innovative technologies and strategies to lower their emissions.

This system facilitates the recommendation of eco-friendly products and procedures to both manufacturers and consumers. The procedure of acquiring environmental certifications can serve as an added motivation for businesses to adhere to regulations and lessen their environmental footprint.

In today's world, a significant emphasis has been placed on the ability of activists to voice their opinions on preserving and safeguarding the environment. This societal pressure has led to increased expectations for businesses and organizations to adhere to regulations and minimize their ecological footprint by embracing sustainable alternatives.

Advancements in technology and innovation within the realm of ecology are crucial in decreasing emissions, enhancing resource efficiency, and promoting cleaner production methods. Numerous countries are actively engaged in global accords and treaties focused on mitigating greenhouse gas emissions and enhancing environmental conditions on a worldwide scale.

The strategic linking of mechanisms enables them to work together synergistically, enhancing each other's capabilities to establish an efficient and logical system for managing atmospheric emissions.

Block 9 the establishment and growth of green spaces in response to urbanization within cities. The primary goal behind developing green areas was to establish parks, plazas, and botanical gardens to reduce carbon dioxide levels and enhance air quality. Urban green spaces play a crucial role in preserving natural vegetation and ecosystem balance.

The significance of these local areas lies in their ecological, social, and aesthetic importance. They play a crucial role in sustaining biodiversity within urban environments, providing a habitat for a diverse range of plant, animal, and bird species. Additionally, green spaces are essential for absorbing carbon dioxide, releasing oxygen, and ultimately enhancing air quality[16-26].

Another aspect of green spaces is their ability to play a significant role in climate regulation by offering cool and shaded areas, helping to combat the urban heat island effect.

Cities experience a notable increase in temperature compared to the surrounding rural areas. In urban areas with numerous tall buildings, these green spaces can serve as a

sanctuary for individuals to unwind, find solace in the shade of trees, socialize, and gain a positive impact on their mental well-being. This can lead to a reduction in stress levels and an enhancement of overall mood among city dwellers.

At the regional level, green islands are seen as a creative solution to develop a sustainable and eco-friendly environment. These islands may incorporate vertical gardens on terraces, balconies, and rooftops of buildings, along with other inventive initiatives to maximize urban space utilization.

Therefore, the presence of green spaces within urban areas holds significant importance in enhancing the overall quality of the city environment, fostering the development of sustainable and health-conscious communities. This aspect is a key consideration in contemporary urban planning, emphasizing the integration of environmental and social factors [27-35].

Table 1. Conclusions on the implementation of the "clean air" concept

Strong Properties Strong Properties	**Characteristic**
• Interaction of government agencies, enterprises, public organizations and citizen activity; • Integration of various fields such as industry, energy, transport and construction; • Providing financial incentives, subsidies and tax incentives to enterprises that adopt environmentally friendly technologies can encourage the transition to more environmentally friendly production methods; • Functioning of financial mechanisms to support environmentally responsible investments; • Support and encourage innovation in the field of sustainable development and efficient use of resources; • International cooperation and exchange of experience in reducing emissions and supporting global efforts to combat climate change to ensure clean air on planet Earth.	• The use of strict standards and regulations on emissions into the atmosphere; • Regular updating and adaptation of standards in accordance with new technologies and scientific discoveries; • A broad educational campaign on the impact of emissions on health and the environment necessary for the formation of environmental literacy; • Public awareness of the causes and consequences of air pollution, which contributes to the active participation of citizens in solving problems; • The regularity of monitoring to monitor air quality and assess the impact of various factors on the environment and public health necessary to correct strategies and plans.

5 Summary

5.1 How To Consider The Effectiveness Of Laws?

We aim to outline the essential principles required for laws to be effective.

- It is imperative for regulations to establish the acceptable limits of emissions.
- Legislation should require the implementation of air quality surveillance systems.
- Legislation should incorporate methods for offering financial rewards and consequences for businesses.
- Legislation should promote the adoption of environmentally friendly and high-performing technologies, while also establishing guidelines for emissions levels in new machinery.
- Legislation should incorporate provisions for oversight and consequences in cases of breaching its provisions.
- Legislation should clearly outline the penalties and enforcement actions that will be implemented.

6 Conclusion

In the realm of medical science, ensuring atmospheric protection involves establishing and adhering to stringent air quality regulations, advocating for the use of eco-friendly technologies and efficient air cleansing techniques, and conducting studies to understand the health consequences of pollution. It is imperative to implement strategies that mitigate the adverse effects of emissions on human well-being.

The legal perspective on emissions in the air involves protecting citizens' rights to a clean environment and holding the government accountable for its upkeep. Each State's Constitution contains clauses that secure citizens' entitlement to a healthy environment.

State regulations and laws aim to strike a harmonious balance between fostering economic growth and safeguarding the environment and public health.

References

1. I.A. Zueva, Bulletin of the S.Y. Witte Moscow University. Series 1: Economics and Management. **4 (23).** 27–36. (2017). doi:10.21777/2587–9472–2017–4–27–36
2. A. Soltangazinov, et.al. (2017). Revista Espacios, **38(34),** 2017
3. Kazizova S. et al., (2017). J. Advanced Res. L. & Econ., **8,** 78. DOI: 10.14505/jarle.v8.1(23).09
4. Bugubaeva R., et al. Public Policy and Administration, 2019, **18(2),** 299–313, DOI: https://doi.org/10.13165/VPA-19-18-2-09
5. Mataeva B., et al. Espacios, 2018, **39(11),** 31–44
6. Tazhbayeva, A., et al. Journal of Environmental Management and Tourism 2023, **14(3),** 767–777. DOI: 10.14505/jemt.14.3(67).16
7. Irmak A., et al. International Journal of Energy Economics and Policy, 2023, **13(4),** 46–60, DOI: https://doi.org/10.32479/ijeep.14366
8. Korgan B. et al. Journal of Environmental Management and Tourism, 2022, **13(1),** 135–142, DOI: https://doi.org/10.14505/jemt.v13.1(57).12
9. Turdiyeva, Z.M., et al. Actual Problems of Economics, 2015, **169(7),** 106–111
10. Turdieva Z., Economical Effectiveness of Using Biofuel of Agricultural Organizations (On the Material of East Kazakhstan Region). World Applied Sciences Journal **27** (Education, Law, Economics, Language and Communication): PP.414-418, 2013 DOI: 10.5829/idosi.wasj.2013.27.elelc.85
11. Amanova, G.D., et al. Rivista di Studi sulla Sostenibilita, 2023, **13(1),** 65–81 DOI 10.3280/RISS2023-001-S1005
12. Abdrakhmanova A.U., et al. Journal of Environmental Management and Tourism, 2017, **8(1),** 155–167, DOI: 10.14505/jemt.v8.1(17).16
13. Amanova, G., et al. Journal of Advanced Research in Law and Economics, 2016, **7(3),** 483–493 DOI: 10.14505/jarle.v7.3(17).03
14. Akimova B., et al. International Journal of Energy Economics and Policy, 2020, **10(2),** 374–381 DOI: 10.32479/ijeep.8669
15. Bayakhmetova, A., et al. E3S Web of Conferences **460**, 03018 (2023) https://doi.org/10.1051/e3sconf/202346003018
16. Rudyk, N.V., et al. Lecture Notes in Networks and Systems, 2022, **245**, 167–174 DOI:10.1007/978-3-030-77000-6_20

17. Yessymkhanova, Z.K. et al. Studies in Systems, Decision and Control, 2021, **314**, 663–667 DOI:10.1007/978-3-030-56433-9_69
18. Niyazbekova S., Nazarenko O. Economics and Management. 2018. **4 (27).** 7-14. doi: 10.21777/2587-554X-2018-4-7-14
19. Niyazbekova S., Uspambaeva M., Moldashbaeva L. Economics and Management. 2019. **3(30).** 15-20. doi: 10.21777/2587-554X-2019-3-15-20
20. Imangozhina Z., Niyazbekova S. Economics and Management. 2019. **1(28).** 15-20. doi: 10.21777/2587-554X-2019-1-15-20
21. Niyazbekova S., Bunevich K. Economics and Management. 2017. **3(22)**. 24-31. doi: 10.21777/2307-6135-2017-3-24-31
22. Niyazbekova S., Ivanova O. Economics and Management. 2020 **1(32).** 30-36. doi: 10.21777/2587-554X-2020-1-30-36
23. Yarovenko S., Niyazbekova S. Economics and Management. 2021. **4(39).** 48-57. doi: 10.21777/2587-554X-2021-4-48-57
24. Niyazbekova S., Bunevich K. Economics and Management. 2020. **3(34).** 50-56. doi: 10.21777/2587-554X-2020-3-50-56
25. Yessymkhanova, Z., et al. *Explore the prospects of the water sector within the framework of sustainable development*. IOP Conference Series: Earth and Environmental Science in 2021. DOI:10.1088/1755-1315/937/3/032027
26. Yessymkhanova, Z., Niyazbekova, Sh., et al. (2021) IOP Conference Series: Earth and Environmental Science, **937(3),** 032012. DOI:10.1088/1755-1315/937/3/032012
27. Ganebnykh E. et al., E3S Web of Conferences **531**, 0 (2024) https://doi.org/10.1051/e3sconf/202453105011
28. Rudyk, N.V. et.al. (2022). Development and Regulation of the Digital Economy in the Context of Competitiveness. In: Bogoviz, A.V., Suglobov, A.E., Maloletko, A.N., Kaurovaa, O.V. (eds) Cooperation and Sustainable Development. Lecture Notes in Networks and Systems, vol **245**. Springer, Cham. https://doi.org/10.1007/978-3-030-77000-6_20
29. Petrova, L.A. et al. Lecture Notes in Networks and Systems from 2022, **245**, 183–192. DOI:10.1007/978-3-030-77000-6_22
30. Yessymkhanova, Z.et al. E3S Web of Conferences, 2021, **284**, 02020 DOI:10.1051/e3sconf/202128402020
31. Sarbassova S., et al. E3S Web of Conferences, 2021, **244**, Article 01016. DOI:10.1051/e3sconf/202124401016
32. Bayakhmetova A., Bayakhmetova L., Bayakhmetova L., Daniyar M., Shchepkina N. (2023). E3S Web of Conferences **460**, 11009. https://doi.org/10.1051/e3sconf/202346011009
33. Rudyk N.V., et al. Lecture Notes in Networks and Systems, 2022, **245**, 167–174 DOI:10.1007/978-3-030-77000-6_20
34. Goigova M. et al. Studies in Systems, Decision and Control, 2021, **314**, 663–667 DOI:10.1007/978-3-030-56433-9_69
35. Sembiyeva, L. et al. G. (2023), Montenegrin Journal of Economics, **19**, 4, 187-198 DOI: 10.14254/1800-5845/2023.19-4.16