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ORIGINAL PAPER

Problems of the effectiveness of the implementation of international agreements in the field of waste management: the study of the experience of Kazakhstan in the context of the applicability of European legal practices

Roza Zhamiyeva, et al. *[full author details at the end of the article]*

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Abstract
The issue of developing effective legal regulation of waste management and implementation of best practices in this area is relevant for many countries of the world. In the Republic of Kazakhstan, the development of a regulatory framework for waste management is still in its infancy. This situation poses a potential threat to the environment and public health. The question of this study is what are the obstacles to the effective implementation of international agreements in the field of waste management in Kazakhstan? What international legal instruments in the field of waste management are not fully used and what legislative initiatives need to be implemented in this regard? In order to assess the applicability of their regulations to the conditions of Kazakh law, the study examines such supranational legal instruments as, in particular, the Basel Convention on the Control of Transboundary Movements of hazardous wastes and their disposal, the Espoo Convention, Directive (EU) 2018/852 of the European Parliament and of the Council. As this study suggests, an impending problem for Kazakhstan is the issue of utilization of WEEE and the implementation of the Basel Convention regarding the issue of transportation and disposal of WEEE. Despite the growing interest in the issues of proper waste management, mechanisms related to the implementation of the Espoo Convention and the Aarhus Convention are poorly implemented in Kazakhstan. This study uses the method of political and legal analysis, with the help of which it examines the problems of the effectiveness of the implementation of international agreements in the field of waste management in the Republic of Kazakhstan and ways to overcome them. To achieve these goals, international legislative acts in the field of environmental protection and the legislation of the European Union and EU member states were analyzed, which made it possible to determine the possibility of applying foreign practices on legal regulation of waste management and implementation of international legal acts mechanisms in Kazakhstan. The study attempts to give a qualitative assessment of the elaboration of the legislative regulation of the waste management sphere in Kazakhstan. The solution of problems in the field of waste management at the state level can be feasible only with a systemic rather than partial reform of the legal framework. Based on the EU practices in the implementation of international and supranational environmental agreements, the optimal combination of state and market instruments

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would improve the regulatory framework of Kazakhstan in the field of waste management. In order to create the most beneficial effect in countering the accumulation of waste without harming the economy, it would be useful to apply proactive and preventive approaches to increase the responsibility and participation of all stakeholder groups.

Keywords Environmental legislation · Environmental management · Legislative regulation of waste management · Life cycle assessment · Waste management · Zero waste

1 Introduction

Waste management policy has changed in recent decades in response to social and environmental challenges (Kim & Mackey, 2014; Su et al., 2007; Wilson et al., 2015). However, modern waste management practices fail to keep up with the continuous growth of waste generation in developing countries. Inadequate collection and disposal systems have led to potential population health and environmental pollution risks (Bezama et al., 2007; Orazbayev et al., 2013). Thus, the lack of comprehensive and appropriate waste management systems confirms the importance of facilitating a comprehensive assessment of the current state of affairs and actions to take to address major environmental challenges (Inglezakis et al., 2017; Syrlybayew et al., 2016).

One of the priorities in environmental protection is to address waste management problem with solid household waste produced in residential areas being the most pressing challenge due to its complex morphological structure and uneven distribution of sources (Syrlybayew et al., 2016).

Waste prevention means actions taken before a substance or product becomes waste. Besides, these waste prevention actions ultimately affect waste reduction, including product reuse, or life cycle extension, reduction in the adverse impact of generated waste on the environment, human health and reduction of harmful substances in materials or products (Garnett et al., 2017). To start with, this involves economic instruments, such as encouragement of non-waste technologies, establishment of mandatory payments by consumers for a certain item or element of packaging, for example, a plastic bag. Awareness campaigns are an important waste prevention activity (Pandey et al., 2018).

Changes in conceptual approaches to waste management and the transition from waste disposal to prevention and reduction in waste production and the introduction of sorting, recycling and use of waste as material and energy resources are central to achieving a positive outcome of waste problems both in Europe and in developing countries, such as Kazakhstan.

Given today's challenging situation with waste management in the country, it is vital to set the right priorities and choose the right actions to steer waste management sector out of crisis. Therefore, it would be appropriate to refer to reliable European and global waste management trends and practices in order to considering the possibility of applying international practices in the field of waste management in Kazakhstan. The European Union policy in this direction deserves special attention, since the EU traditionally assigns a special role to environmental and sustainability issues. In the EU countries, the waste management system presupposes an integrated system of various aspects: social, economic, regulatory, managerial, technical. In addition, the principles of sustainable development define the main direction of waste management and form the basis for a hierarchy of waste management methods. These principles form the basis of all regulations related to waste

management. For the phased implementation of the waste management concept, the legislative acts of the EU countries, on the one hand, establish requirements for various aspects of waste management, taking into account development targets, on the other hand, create conditions for their achievement. Legal and physical responsibility for each waste management task is delegated to different levels of government. Waste management policies in the EU countries were developed more than 30 years ago with the aim of harmonizing waste management and preventing potentially threatening technological developments in market conditions (Baker, 2007; Minelgaitė & Liobikienė, 2019).

The core principles of Kazakhstan's environmental policy are set out in the President's Strategy, called 'Kazakhstan 2030,' adopted and published in 1997. One of its priorities is to call for an active start of events and awareness campaigns addressing the country's major environmental challenges, which will lead to improved living standards and public health. Over time, the Strategy laid the groundwork for various environmental and country development programs and outlined priorities of the state agenda with regard to green development. The 2007 Environmental Code became the main high-level legislation in waste management. However, with the adoption of the new edition of the Environmental Code of the Republic of Kazakhstan on January 2, 2021, provisions that should bring the level of the country's waste management closer to international standards and the latest environmental requirements will come into effect on July 1, 2021.

It was recommended to adopt product life cycle assessment for evaluation of alternative technologies to maximize integrated waste management (Stevens & Kanie, 2016). Indeed, according to research, life cycle assessment has been widely accredited for its ability to assess the potential environmental damage and benefits associated with different waste treatment configurations in both developed and developing regions (Song et al., 2013; Tock & Schummer, 2017; Yay, 2015). However, inconsistent methodologies, as well as specific local conditions, make it difficult to obtain an absolute ranking of alternative waste management programs (Bernstad & la Cour Jansen, 2012). Therefore, while these differences are not crucial for the order of preference, it is advisable to analyze each situation separately in anticipation of progress toward a common methodological framework among life cycle assessment practitioners (Cleary, 2009).

Waste management regulation in Kazakhstan is in its infancy with most of waste being disposed of in open dumps and only a small part going to engineering dumps (Noya et al., 2018; Orazbayev et al., 2013). Commonly, only about a quarter of the population outside major cities has access to municipal solid waste collection services, and 97% of MSW is hauled off to uncontrolled and substandard dumps without any treatment or recycling (Inglezakis et al., 2018). There has been little incentive for local authorities and waste management businesses to add value by recycling, composting or recovering energy from municipal waste, with recycled volumes accounting for less than 5% of total waste (Concept, 2013).

The country currently lacks waste to energy plants, such as centralized incinerators or biological plants, and there is no production of green energy from MSW organized (Syrlybayew et al., 2016). It is obvious that Kazakhstan needs to develop a new integrated waste management system, taking into account recent institutional and legal reforms and existing effective European legal practices (Sarina et al., 2016). It is expected that the adoption of the new Environmental Code of the Republic of Kazakhstan will remedy the situation and facilitate development of waste management techniques and infrastructure. In particular, the new document provides for transition to waste to energy technology.

As things stand, there are gaps in environmental assessment of prevailing waste management technologies that are becoming obsolete in Kazakhstan, in addition to potential

alternatives for transition to a more sustainable structure in the country. Moreover, a waste management plan worked out at the highest level would help achieve the Sustainable Development Goals related to environment and bring Kazakhstan's environmental policy closer to high European standards.

The purpose of the research was to explore ways to improve the waste management system of the Republic of Kazakhstan in the regulatory aspect. In this regard, we analyzed the existing waste disposal methods, waste neutralization and treatment measures, as well as the requirements and standards enshrined in the national legislation.

Practical significance of the research involves scientific and practical rationale for compliance of waste management system at the national level to determine compliance with the best European legal practices, select household and industrial waste management methods ensuring compliance with environmental requirements. This calls for a system environmental and legal analysis of waste management, making it possible to assess environmental impact and study environmental legal requirements for waste management in the Republic of Kazakhstan.

Modern studies concerning the implementation of waste management policies usually consider this issue from the point of view of the "operational" part of the implementation of domestic political initiatives in this area. At the same time, a very minor role is given to the problem of the effectiveness of the implementation of international agreements in the field of waste management in the Republic of Kazakhstan. This study is intended to fill this gap, which in turn leads to a research question: What constitutes obstacles to the effective implementation of international agreements in the field of waste management in Kazakhstan, how international legal regulation can contribute to the improvement of legislative regulation in Kazakhstan and what legislative initiatives need to be implemented in this regard.

2 Materials and methods

The research considers the problems of the effectiveness of the implementation of international agreements in the field of waste management and ways to improve the waste management system of the Republic of Kazakhstan in the regulatory and legal aspect. In the frame of consideration of the legislative regulation of the waste management sphere in Kazakhstan, the study attempts to carry out a qualitative assessment of the effectiveness of the application of international legislative acts in the field of environmental protection, implemented by Kazakhstan (in particular, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, Convention on Environmental Impact Assessment in a Transboundary Context).

Herewith, the article analyzes the interdependence of the elements of regulation system of the national waste management plan in its interdependence with all environmental and legal processes in the country. Comparative law method made it possible to study the best waste management practices at the national and supranational levels in Europe with further isolation and adaptation of relevant achievements to the Republic of Kazakhstan.

In particular, comparative analysis was based on the Environmental Code of the Republic of Kazakhstan (as amended), and the Environmental Code of the Republic of Kazakhstan adopted on January 2, 2021, which will come into force on July 1, 2021, by-laws

governing waste management in specific areas, the Strategic Plan of the Ministry of Energy and Territorial Development Programs (local level), the Solid Waste Management System Redesign Program forming the basis of the Strategic Plan, as well as the Concept for Transition of the Republic of Kazakhstan to Green Economy. Comparison with European legislation was made by analyzing the provisions of Directive 2008/98/EC on waste, EU Directive 2018/851, programs adopted to implement these directives, as well as certain Polish laws. Polish laws were taken into account in view of Poland's territorial proximity to Kazakhstan from all EU countries, and its relative similar state structure.

The problem of the country's waste management system was studied through consideration of waste management plans and waste treatment methods at the local level. In Nur-Sultan (formerly Astana) for example, with 1,118 tons of municipal waste produced daily, in the absence of proper waste collection system, only about 800 tons/day (72% of the total amount of MSW produced) are subject to further, and the rest is not controlled. The current waste management system in Nur-Sultan is mainly based on mechanical separation of only a small part of recyclable materials and organic waste (prior to disposal in a dump) to the detriment of disposal practices used in other regions of the country (Noya et al., 2018). However, despite efforts, this waste management strategy leaves a lot to be desired, and the city is developing further research to implement more sustainable treatment schemes (Inglezakis et al., 2017; Noya et al., 2018).

To give a more detailed answer to the task at hand, we used doctrinal developments in the field of environmental law, environmental management and regulation of the management of various types of waste, as well as the impact of restrictions imposed by environmental standards.

Given the complexity of waste management, multi-criteria decision-making models have become important as they can address problems involving multiple dimensions and conflicting criteria (Khan et al., 2016; Song et al., 2013). Many experts treat multi-criteria analysis tools as superior to other alternatives, such as life cycle assessment, which mainly focuses on environmental aspects, and cost–benefit analysis based on maximizing economic efficiency (Goulart Coelho et al., 2017). Life cycle and economic assessments are performed separately, most often using different system boundaries and assumptions (Martinez-Sanchez et al., 2015). Multi-criteria analysis addresses all three pillars of sustainability, i.e., economic, social and environmental criteria (Goulart Coelho et al., 2017).

It should be noted that this research is aimed at studying waste management in terms of legal regulation. The scope of research does not involve the impact of waste management methods on the environment as a whole or a detailed study of waste disposal or recycling methods, etc. The research only scratches the surface of this matter to get the full picture to determine effectiveness of waste management regulation.

3 Results

3.1 Current state of waste management regulation in the republic of Kazakhstan

The 2007 Environmental Code is the main act of law governing waste management in Kazakhstan. The Environmental Code has been amended from time to time since 2008 to address waste management. In 2011, it was amended to oblige all enterprises involved in waste disposal and recycling to develop and approve waste management programs. Such programs have become part of the document package filed when applying for an

environmental permit. Besides that, since 2011, the Environmental Code has included requirements for storage of waste containing persistent organic pollutants.

Since 2015, in accordance with the Law on Amendments to Certain Legislative Acts of the Republic of Kazakhstan on Industrial and Innovation Policy, the Environmental Code has included a new chapter expanding producer/importer obligations. After that, in 2016, they introduced new producer obligations as regards cars and their components (tires, batteries, oils). In 2017, new restrictions were imposed on various electrical and electronic equipment and also extended to packaging made of paper, plastic, metal and glass. Relevant by-laws contain a list of goods subject to extended producer responsibility (Minister of Energy of the Republic of Kazakhstan, 2015) and the extended producer (Importer) Responsibility Implementation Rules (The Republic of Kazakhstan, 2016). 2016 gave rise to the creation of a working group tasked with improvement of the regulations for implementing the extended producer responsibility principle, which is still functioning.

In 2016, the Environmental Code was also amended to expand the list of waste types prohibited from land disposal. On December 31, 2018, dumps must have stopped accepting plastic, polyethylene, paper, cardboard, glass, and construction and organic food waste from December 31, 2020.

In 2016, the Law on Amendments to Certain Legislative Acts of the Republic of Kazakhstan on the Transition of the Republic of Kazakhstan to Green Economy introduced a requirement in the Environmental Code to equip all modes of transport collecting solid waste with satellite navigation systems. The change was adopted to prevent fly dumping and improve waste control. The same law allowed industrial enterprises to store their waste within six months without charging fees for emissions into the environment.

Other changes include the adoption of the abandoned hazardous waste management rules and the radioactive waste and spent fuel collection, storage and disposal rules. Moreover, the 2015 Entrepreneurial Code provides for investment preferences for investment projects involving the types of operations included in the List of Priority Activities. This list includes hazardous waste collection, non-hazardous waste treatment and disposal, and disposal of sorted materials, excluding ferrous and non-ferrous waste and scrap recycling.

The central task of the 2014–2020 solid waste management system redesign program adopted in 2014 involved reclamation of existing and construction of new disposal sites, introduction of separate waste collection at source, improvement of hazardous waste management and expansion of waste recycling facilities. This program was terminated in 2016; however, its provisions were included in the Strategic Plan of the Ministry of Energy and territorial development programs (local level).[1] Therefore, the 2013 Concept for the Transition of the Republic of Kazakhstan to Green Economy is the only instrument at the national level containing target waste indicators.

Waste management is a challenge in Kazakhstan due to its unbalanced development. The regulation of household waste management focuses on recycling, while little attention is given to the regulation of modern disposal site arrangement. Recycling companies fail to separate waste and cannot achieve the expected results in terms of waste separation, in particular due to the monetary reward the households receives when delivering recycled materials to collection points. At the same time, it is important to note that there were improvements in the field of waste management stemming from economy modernization

[1] Speaking about the status of strategic documents in Kazakhstan, it should be noted that these documents, being included in the legal system as sources of law of a political and ideological nature, most significantly affect the formation of almost all other elements of the country's legal system (Koulouri, 2021).

processes (Tsindeliani et al., 2021). However, the waste accumulated over time reduces the significance of waste management results achieved at the present stage. Solving the above-mentioned problem of accumulated radioactive and hazardous waste is a top-priority task at the country level, resulting in problematic aspects of non-hazardous waste management having no due attention and modern regulation.

Country's governing bodies determine the policy and goals to be implemented; however, their implementation falls entirely on the local authorities and the private sector without the necessary support from public authorities. Waste management laws enshrine modern approaches, but everyday practice is still based on the old Soviet-era approach.

A waste management plan option should be selected with reference to economic implications. The environmental authorities of Kazakhstan mainly employ the indirect method, which is simpler to use, yet generally entails a significant increase in damages and does not provide for clean-up of the actual environmental damage. As in many other countries in Eastern Europe and Central Asia, the indirect method determines the cost of "pollution damage" depending on current pollution charges by calculating the "pollution damage" for each pollutant using a mathematical formula and then summing the resulting estimated damages for each of them (Pobedinsky & Shestak, 2020). The indirect method of calculating the amount of damages in value form is based on the use of a predefined formula and, therefore, does not require quantitative measurement (or proof) of the actual environmental damage when determining the amount of compensation to be paid. Both direct and indirect methods, as provided for by applicable laws, are contrary to the legal principles applied in many OECD member countries, since liability for environmental "damage" is incurred when exceeding the predetermined limits prescribed in the permit. Most costing systems are designed to meet applicable legal and regulatory requirements, so they do not track or declare costs associated with sustainability and cost-effectiveness.

Product life cycle assessment can be used to create scenarios for future overall assessment. Inclusion of previously excluded types of costs in the decision-making process is the greatest benefit from using the LCA output to fully evaluate project costs.

It should be noted that LCA is one of the tools of EIA (Environment Impact Assessment)—process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socioeconomic, cultural and human health impacts, both beneficial and adverse. The EIA methodology has gained recognition in almost all developed countries. In June 1988, Council Directive 85/337 / EEC of June 27, 1985 on the assessment of the effects of certain public and private projects on the environment was enacted. It is mandatory for EU member states to conduct EIA before issuing a permit for all major projects that may have a negative impact on the environment. On February 25, 1991, there was adopted the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, Finland), based on the European EIA model. The Espoo Convention is an international treaty that obliges states to conduct environmental impact assessments of commercial projects where such projects may affect the environment of another state. The Republic of Kazakhstan joined the Convention on October 21, 2000 (UNECE, 2020).

The obligation to undergo the EIA procedure when intending to carry out production activities is regulated by clause 1 of article 36 of the Environmental Code of the Republic of Kazakhstan. In the process of developing preplanned, planned, pre-design and project documentation justifying economic and other activities in the Republic of Kazakhstan, the EIA procedure is carried out in the order of successive stages, in accordance with paragraph 2 of Article 37 of the Environmental Code of the Republic of Kazakhstan.

Despite the importance of the latest document for international cooperation in the field of reducing the negative human impact on the environment, there have been no specific examples of transboundary EIAs in Kazakhstan in recent years. Also, over the past decade, there has been no substantial support from the Convention Secretariat to Kazakhstan in implementing the convention (Rzabay, 2020). The last time, only in 2009, a pilot project on transboundary EIA between Kazakhstan and Kyrgyzstan was carried out (OSCE, 2010).

Speaking about initiatives related to the transition to a circular economy, it should be noted that Kazakhstan, like other Central Asian countries, is at the very beginning of the road. According to some estimates, today about 15% of waste is recycled in Kazakhstan. (Kadyrgaliyeva, 2020). An impending problem is the issue of WEEE (Waste from Electrical and Electronic Equipment) disposal. In general, it should be noted that the only subregion of Asia where national legislation on e-waste is still not in force on the territory of the countries is Central Asia. In 2016, the subregion generated 6.4 kg of e-waste per capita, for a total of 154 kilotons. Although this figure is not comparable to the production of 10.2 million tons recorded in East Asia, the need to regulate the management of e-waste is imminent. In Kazakhstan, one of the projects implemented jointly with the Ministry of Energy of the Republic of Kazakhstan and the private sector and aimed at promoting the efficiency of services for the collection, transportation, use and disposal of e-waste has taken initiatives to improve the quality of the legal framework for the management of e-waste. The results of the questionnaire survey carried out in the countries of this subregion show that there is still no legislation or any statistical tools for e-waste, but work is underway to develop them (Baldé et al., 2017).

Electronic waste is subject to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, which prohibits the movement of hazardous waste between developed and developing countries. Compliance is difficult to monitor, however, as there is no reliable data on the volume of exported electrical or electronic equipment that would be categorized unequivocally as e-waste. Moreover, some analysts argue that current international law does not facilitate the accounting of transboundary e-waste flows and thus limits the potential to address impacts on vulnerable populations (Ilyassova et al., 2020).

The Basel Convention was developed with the very specific purpose of regulating the transboundary movement of hazardous wastes. It was not intended to regulate recycling practices or operations, allowing countries to use the Basel Convention to determine the fate of POPs (Persistent organic pollutants) stocks and wastes on our planet, it could actually create a situation where a POPs treaty could do more harm to the environment than good.

Numerous international environmental and climate change initiatives (such as COP 25) have grown in scope in recent years. Given the current challenges, the transport of potentially hazardous waste from one state to another, with a view to its further disposal, must take into account the guarantees that this waste will be disposed of properly. So, the question arises about the development of an appropriate international act, which provides for the proper disposal of potentially hazardous waste during their transboundary movement and the responsibility of the parties regarding the proper implementation of such a procedure (Baldé et al., 2017; Ilyassova et al., 2020).

With regard to the countries of Central Asia in matters of disposal of electronic equipment, the experience of Kazakhstan is of interest, since this state was the first among the countries of this region to take the initiative to introduce EPR (Extended producer responsibility) into national legislation (TAGNews, 2018). According to estimates, every year, 343,000 tons of e-waste is generated in Kazakhstan (UNDP Kazakhstan, 2020). At the

same time, the problem was the lack of collection points for electronic equipment in public places, the purpose of which the population should know, as well as appropriate support from the state and manufacturers of electronic equipment.

These key aspects of effective e-waste management were the focus of the joint project of UNDP and the Ministry of Energy of the Republic of Kazakhstan with the financial support of Samsung Electronics Central Eurasia "E-waste management," which demonstrated a successful example of public–private partnership. An unprecedented partnership between UNDP and private company Samsung has given impetus to address such an important issue for the country as e-waste management.

In 2013, the EPR principle was included in the Concept for the transition of the Republic of Kazakhstan to a Green Economy, in connection with which work on the development of legislation began in the republic (UNDP Kazakhstan, 2020). The state policy of Kazakhstan in the field of waste management is defined in the Concept for the transition of the Republic of Kazakhstan to a "green" economy and is aimed at the introduction of separate waste collection, development of the waste processing sector with the receipt of products from recyclable materials with the attraction of investments, including through public–private partnerships. According to the Concept, by 2030, the share of waste recycling should be increased to 40%, by 2050—to 50%. In order to develop the sphere of processing solid household waste, the regulatory legal framework has been improved. In particular, amendments were made to the Environmental Code. Since 2016, it has been prohibited to dispose of mercury-containing lamps and devices at landfills, scrap metal, waste oils and fluids, batteries, e-waste (EGov, 2021).

Kazakhstan has adopted a quite comprehensive and ambitious framework for EPR implementation. In less than three years from 2016–2018, the scope of EPR has expanded from its original coverage (automobiles and their components) to packaging and recycling of electrical and electronic equipment (WEEE). The legal framework for ERP in Kazakhstan is presented in chapter 41–1 of the Environmental Code, entitled "Expanded Obligations of Producers and Importers." In accordance with this regulation, any natural or legal person engaged in the production or import of electronic and electrical goods into Kazakhstan is subject to EPR obligations.

According to the Environmental Code, "extended obligations of manufacturers and importers" means that they are obliged to ensure the collection, transportation, treatment, decontamination, recycling and/or disposal of waste and packaging. The provisions of the Environmental Code of Kazakhstan provide two options for fulfilling EPR obligations: 1. Using our own system to fulfill EPR obligations, 2. Concluding an agreement with an EPR operator for organizing the collection, transportation, processing, decontamination, recycling and/or disposal of waste and packaging, for an agreed fee set in accordance with the fee calculation method (OECD, 2019). At the same time, it would be premature to assess such initiatives from a long-term perspective at the moment. Nevertheless, according to the data of state authorities for 2020, due to the Extended producer responsibility (EPR) mechanism introduced in 2016, it was possible to increase the share of solid waste recycling by 6 times—from 2.6 to 15%. However, it is noted that this is extremely insufficient, compared with developed countries where this indicator is much higher. A high share of processing is noted in Mangistau (33%), Almaty regions (23.3%) and Shymkent (22.7%), and a low one is noted in Akmola (3%), East Kazakhstan (3.3%), West Kazakhstan (8.6%) regions.[2]

[2] See: Official information resource of the Prime Minister of the Republic of Kazakhstan. Increasing the share of waste recycling and promoting environmental initiatives—M. Mirzagaliev spoke about the work done https://primeminister.kz/ru/news/reviews/uvelichenie-doli-pererabotki-othodov-i-prodvizhenie-ekologicheskih-iniciativ-m-mirzagaliev-rasskazal-o-prodelannoy-rabote-1053421.

Economic and production growth and continued urbanization in Kazakhstan are the reasons for the annual increase in the volume of municipal solid waste. In different regions of the country, there were made numerous attempts to create a system of separate collection and processing of waste, but almost every time, they failed due to a complex of reasons, the main of which were lack of motivation among the local inhabitants, lack of necessary infrastructure, limitations of the regulatory framework, weak support from local authorities, counteraction of waste collection companies that are not interested in the emergence of competitors.

Among other issues, it is worth to highlight the lack of a system for the separate collection of municipal waste, with the exception of collection points for traditional secondary raw materials (paper, glass etc.), the lack of economic incentive among the population to conduct separate collection of municipal waste, an underdeveloped market for secondary raw materials, as well as the lack of state statistical recording of the volumes of processing and disposal of secondary raw materials (Zhandybaev, 2018).

It can be concluded that constraints of proactive planning (including all decisions and excluding extraordinary reworking of plans and response to momentary changes) at the local, regional and state levels of government are one of the main reasons for the current situation and poor waste management regulation. Adoption of relevant legislation, wholly new laws, instead of selective amendments to the old ones (not corresponding to the current environmental situation) could fix the problem only when the executive bodies and local government offer their comprehensive support. There are serious information problems and a lack of quality analysis and data validation. Waste generators must arrange for the disposal of the generated waste using their own resources, while they fail to find an alternative way of management or a place for safe disposal of such waste. The situation results in a fragmented, in most cases, chaotic and environmentally unacceptable scheme and entails inefficient use of limited financial resources.

However, it is recognized that the Environmental Code of the Republic of Kazakhstan adopted on January 2, 2021, which will come into force on July 1, 2021, provides for positive developments in waste management. Compared to the old one, the new Environmental Code provides for new conceptual approaches that should improve system-level environmental protection (The Republic of Kazakhstan, 2021). Thus, Article 328 of the Environmental Code captures waste management principles already known in European legal practice. It specifies that the national environmental policy in terms of waste management is based on the following special principles.

1. Hierarchy;
2. Proximity to the source;
3. Responsibility of the waste generator;
4. Extended producer (importer) responsibility.

In addition, the new code provides standards for thermal treatment of waste, this is done to reduce the amount of waste at disposal sites. The document also provides for a notification procedure for non-hazardous waste and a licensed procedure for hazardous waste processing plants. There should be a waste hierarchy aimed at phased waste management implemented.

As regards government environmental monitoring, the old code provided for a special permit from the prosecutor's office to initiate an inspection against a polluting enterprise. The new code provides for a 'surprise inspection.' Therefore, for accidental or other types of pollution, the inspector may start an inspection based on an article in the media or statements by NGOs, without obtaining permits from the prosecutor's office. This will make it easier to establish the facts of environmental pollution.

The Environmental Code also provides for the "polluter pays" principle. Administrative sanctions for limit-exceeding environmental emissions will increase. The code offers tougher sanctions for environmental violations. For example, administrative sanctions for excess and unauthorized environmental emissions will increase tenfold, and they will double on average for other offenses.

However, it should be noted that the adoption of new Environmental Code alone, that is, consolidation of relevant norms and standards, will not fix the problem. As a result of the adoption of the new Environmental Code, the ministry will have to develop and launch about 150 regulations to implement its provisions; continue a comprehensive process audit of the country's industrial giants. It is also necessary to continue work on the creation of best available techniques guides, the introduction of which will significantly reduce environmental damage.

3.2 Application of European legal practices in the development of Kazakhstan's waste management plan

The main EU directive on waste management in the European Union to note is the Directive 2008/98/EC on waste. This directive provides for the following waste management priority (European Union, 2008):

1. Waste prevention
2. Preparation for reuse.
3. Recycling.
4. Another type of recycling, for example for renewable energy.
5. Disposal.

Community waste laws establish the following general requirements for waste management to dispose of waste without endangering human health or processes and methods that may cause damage to the environment (in particular without endangering water, air, soil and plants or animals; without creating noise or unpleasant odors; without adverse effects on the countryside or other important locations); to carry out waste recycle, storage and handling activities only under permits from relevant competent bodies of member states in compliance with such permits; to supervise waste disposal by the competent authorities of member states.

Implementation of the first three stages of the waste management hierarchy in Europe is being promoted as part of the Zero waste initiative across European cities. More and more

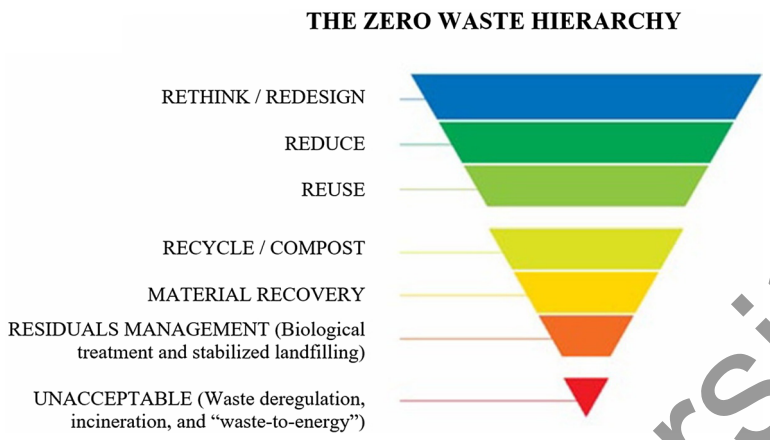

Fig. 1 Zero waste hierarchy

national organizations and local communities are joining Zero Waste Europe. Today, Zero Waste is a direction, not an end goal. Participants in the initiative and communities are working together in cities across Europe to reduce waste and introduce the first steps of the waste management hierarchy.

The waste management hierarchy under the Zero Waste Initiative is built in the manner shown in Fig. 1.

On top of waste management measures specified in the hierarchy to be taken at the national level, the following initiatives are also suggested:

- Development and implementation of waste prevention programs and waste management plans;
- Setting specific percentage targets for reusing and recycling used containers/secondary raw materials (plastic, paper, glass, metal) in legislation;
- Establishment of economic incentive mechanisms for compliance with the waste management hierarchy:

  (a) Obligating producers to implement the goals of reusing/recycling waste generated by their products;
  (b) Establishment of an economically justified rate for land disposal (including full costs of construction, operation, closure, reclamation and maintenance of the disposal site for the next 30 years after its closure in the rate);
  (c) Introduction of the "polluter pays" principle, establishment of economically justified rates for waste management for the households and legal entities, which will include not only removal, but also waste disposal.

The rules set out in Directive (EU) 2018/851 as of May 30, 2018, which supplements Directive 2008/98/EC on waste, permit the use of waste management systems where municipalities have the overall responsibility over collection of municipal waste, or there are systems where such services are provided by private operators, or any other type of allocation of responsibility between public and private entities. Member states remain responsible for choosing and modifying any of these systems.

Thus, the key elements of a waste management strategy are primarily to prevent or minimize waste, and then reuse it, whereas waste recycling or disposal is seen as the final solution applicable only when no other action can be taken with respect to waste. It is obvious that the use and implementation of waste prevention methods are becoming a priority principle of waste management strategy in Europe.

At the same time, planning sustainable waste management in the European Union defines the following priorities in waste disposal: encouraging reuse; giving preference to disposal, especially recycling; reducing the amount of waste to be disposed of; disposal of waste in an environmental-friendly manner; disposal of waste in places close to its production, while not impairing the efficiency of waste management operations (Goulart Coelho et al., 2017).

The above legal practices are reflected in the new Environmental Code of the Republic of Kazakhstan, which was mentioned above. Article 329 of the new edition of the Code obliges waste generators and owners to apply the following hierarchy of measures to prevent and manage waste in descending order of their preference in the interests of environmental protection and sustainable development of the Republic of Kazakhstan:

1. Waste prevention;
2. Preparation of waste for reuse;
3. Waste recycling;
4. Waste disposal;
5. Waste removal.

Waste prevention refers to measures taken before a substance, material or product becomes waste and aimed at:

(1) Reducing the amount of waste produced (particularly by reusing products or increasing their service lives);
(2) Reducing the adverse impact of waste produced on the environment and human health;
(3) Reducing the content of harmful substances in materials or products.

Households will be also informed about the rational system of collection, disposal and recycling of solid waste and separate waste collection.

The hierarchy principle should be applied in view of the precautionary principle and the principle of sustainable development, technical and economic feasibility, as well as the overall impact on the environment, human health and socioeconomic development of the country.

Waste classification has been brought in line with the European waste catalog and will include a list of both non-hazardous and hazardous waste. To address the issue of illegal dumps in a comprehensive manner, the new Environmental Code provides for the mandatory installation of GPS sensors on waste haulers.

It is therefore clear that starting from July 1, 2021, that is, from the date of entry of the new Environmental Code into force, waste management in the Republic of Kazakhstan should get off the ground in a new way in accordance with the best European legal practices.

Europe is moving away from incinerating municipal waste. In particular, on January 26, 2017, the European Commission addressed the European Parliament to review waste incineration in favor of reusing and recycling municipal waste. The document

states that the European Commission is committed to using anaerobic digesters of biodegradable waste. The document also notes that having signed the Paris Agreement, the countries of the European Union have undertaken a commitment on decarbonization of the economy, therefore, incinerators might be closed in the future.

In 2014, the European Commission decided not to amend waste laws, but to use a new horizontal method providing for changes not only with respect to waste, but also covering the full economic cycle of production. Europe has embarked on the path of introducing the circular economy (European Commission, 2020).

The EU's Circular Economy Action Plan sets specific and ambitious goals ranging from production and consumption levels, to waste management, recyclables market and changes to waste management laws. Waste prevention means the measures taken before a substance, product or material becomes waste, to reduce the amount of waste (quantitative prevention), reduce the adverse impact of waste on the environment and health, reduce the content of hazardous substances in materials or products (qualitative prevention). Given that waste prevention is not a waste management operation, separate standards (European Union, 2008)should be developed for waste prevention activities.

Based on this clearly defined policy, a waste management system has been established in the EU member states at the national, regional and local levels. Relevant legislative instruments also afforded ground for organizing a developed infrastructure, created the possibility of safe collection, sorting, transportation, recycling, search for materials and neutralization of generated waste.

On top of the acts adopted by the EU in the field of waste management, the legislation of the EU member states is also developing in accordance with the development of the directives of the European Union. For example, based on the directives of the European Union, Poland adopted the laws on Good Housekeeping in Gminas, on Packaging Waste Management, on Enterprises' Obligations with respect to Certain Waste and Deposit System, on Mining Waste, on Subsoil governing disposal of waste in mines, on Waste defining the terms and basic principles of waste management, as well as waste recycling and disposal methods.

Polish waste management laws provide for the development of waste management plans at two levels: national and voivodship (regional). The plans should apply two basic principles of waste management:

- Self-sufficiency;
- Proximity.

According to the waste management plan, municipal waste cannot be removed outside the region. This requirement does not apply to certain hazardous wastes in cases when there are no relevant recycling facilities in the region. The order of the Minister of Environmental Protection as of December 29, 2016 introduced a mandatory separate collection of biodegradable waste. As regards management of used oils, requirements are to regenerate rather than incinerate. The law also governs management of biodegradable waste (green and food), namely it obliges to collect and compost them separately.

The most economically developed EU countries produce the most waste (Austria, Belgium, Germany, Finland and the UK), which is not a member state at the moment (Minelgaitė & Liobikienė, 2019). Consequently, when implementing waste management policy, waste reduction programs should address the common goals of breaking the relationship between economic growth and waste generation and moving toward a zero waste economy. Promotion of the 3R concept (reduce, reuse, recycle) is one of the

main tools for reducing waste. Thus, countries are encouraging waste reduction behavior, resulting in raising awareness about seriousness of the waste problems and that everybody can contribute to reducing waste.

Thus, the legal regulation of waste management is an integral part of the European Union environmental law. Reducing waste production and eliminating waste production entirely through improved management practices and sustainable resource consumption is one of the priorities of Europe's environmental policy. At the same time, the Community places greater focus on the 3R principle, rather than land disposal. The approach aims to ensure observance of human rights to a favorable healthy environment.

Kazakhstan, being in the early stages of developing modern and effective waste management planning, should invest in public awareness and public education to lay the groundwork for the success of such a system. The country should gradually involve the public in the decision-making process. The Aarhus Convention, drafted and adopted by the members of the UN's Economic Commission for Europe, suggested increasing public participation in environmental decision-making for a good reason, as public participation is often seen as necessary for public support being necessary for the implementation of key elements of the policy.

The Convention states that sustainable development can only be achieved by involving all stakeholders. It relates government accountability and environmental protection. It focuses on the interaction between the public and government in a democracy and paves the way for a new process of public participation in the negotiation and implementation of international treaties. This Convention is not just an environmental agreement—it also addresses such matters as accountability, transparency and government responsiveness to public demands. The Convention was ratified by the Law of the Republic of Kazakhstan No. 92-II ЗРК as of October 23, 2000.

Therefore, implementation of integrated waste management in the country involves a risk that may interfere with the achievement of the set goals and planned results. Such risks may include regulatory risks, macroeconomic risks, financial risks, organizational risks, social risks, natural risks, technical and innovation risks.

Government regulation and management of these risks, allowing limiting the consequences of adverse waste events and processes, should include:

(1) Implementation of the Zero Waste system in accordance with the waste management hierarchy;
(2) Creation of an effective system for organizing plan control, as well as ensuring sustainable development of waste management sector in the presence of the said risks;
(3) Conducting scheduled inspections of natural resources at enterprises under state and local environmental supervision;
(4) Annual monitoring of the ecological situation with waste in the regions;
(5) Extending and deepening the legal framework governing relations in the field of waste, environmental protection and ensuring environmental safety in Kazakhstan.

4 Discussion

The ascending priorities of the EU waste management policy are waste disposal, energy recovery, recycling, reuse and waste prevention (Stoeva & Alriksson, 2017). Researchers agree that reduction, reuse and recycling (3R) techniques are widely accepted waste

management tools (Ma et al., 2018; Matsuda et al., 2018; Pandey et al., 2018). This waste management hierarchy is also key to greening the municipal waste sector by minimizing waste production and achieving a circular economy (Awasthi et al., 2018; Millward-Hopkins et al., 2018; Pandey et al., 2018). Yet the EU's waste policy has mainly defined waste reduction targets (reducing waste mainly through recycling), despite the fact that waste prevention is at the top of the "waste management hierarchy" (Cecere et al., 2014; Wilts et al., 2013).

The Diamond model, a waste management development strategy, was developed back in 1995. The model is about the interconnection of four main components: consumer, business, sponsors and the state. The main objective of the Diamond model is to build a local omnichannel waste management institution that will be cyclical at the local level and achieve the desired waste management results. At each level, the participants in the system should be held accountable and controlled by certain bodies. In general, the Diamond model is designed to combine the main components through such metrics as:

- Consumers—users must change their behavioral philosophy through waste management;
- Business—SMEs should help integrate waste management by creating safe toilets, sorting plastic and providing sorting containers to the households;
- Sponsors mean microfinance institutions and investors granting credits to and increasing the market opportunities of companies that comply with the waste management program;
- State—provides responsibility for the implementation and updating of legislative regulations governing relationship between other parts of the model (Waste, 2020).

Recently, the Decision support software (DSS) technology has become the subject of research in the field of waste management at the national level. The DSS waste management tool is a computer-based, automated system designed to support decision-makers at different stages of waste management planning to fully understand the complex interactions between the numerous factors involved in integrated waste management (Chang et al., 2012).

The DSS tool is divided into several sections that correspond to the stages of waste management plan development (Inglezakis et al., 2016). In Europe, recycling goals and commitments stem from the existing EU waste laws and future waste management policy priorities. There have been studies on the use of this tool in Kazakhstan (Inglezakis et al., 2014). Astana has become one of the cities using the tool, and the available data on waste composition and DSS outputs can be regarded as an ad hoc indicator of the current situation. The DSS tool can provide useful information on how waste structure can change over time (Inglezakis et al., 2018).

The waste to energy technology, which is actively used and introduced into national waste management plans at the legislative level, has been widely researched. Many facilities using WtE technologies operate in developed countries such as Canada (Shareefdeen et al., 2015), the USA, the United Kingdom, Germany and the Netherlands (Kayakutlu et al., 2017). This option helps to remove waste from dumps and offers an alternative renewable energy source (Bayramov et al., 2021; Smirnova et al., 2021). However, its implementation depends on legislation and public recognition. Typically, social factors are ignored. However, several studies stress that waste management plans and technologies that do not take social aspects into account are doomed to failure (Milutinović et al., 2016).

For many years Kazakhstan has been taking certain steps toward introducing its own options and using the experience of other countries, mainly European, in proper waste management (Stevens & Kanie, 2016). However, so far, Kazakhstan has not created an appropriate regulatory framework that would enable bringing its standards in line with EU standards.

EU waste management laws are flexible. Given that waste management sector is on the rise, the regulations adopted in the past decades are becoming obsolete due to the global challenges. A perfect example here would be the evolution of the Waste Framework Directive adopted in 1975 (Directive 75/442/EEC), its 2006 revision (Directive 2006/12/EC) and the latest 2008 revision (Directive 2008/98/EC), with the focus gradually changing from safe waste management to the transition to a society of reuse, resource efficiency, sustainable production and consumption. A similar example is illustrated by the evolution of the Packaging and Packaging Waste Directives (Directives 1994/62/EC and 2004/12/EC), as amended in May 2015 (Directive 2015/720/EC) with regard to a new challenge of using plastic disposable bags. By contrast, Kazakhstan's waste management legislation has been evolving less dynamically, and waste management priorities are still based on disposal, rather than reduction and prevention. Despite the fact that the existing legislative regulation in the EU has demonstrated shifting emphasis in waste management, and, as it may seem, could have been borrowed in a certain sense by Kazakhstan, it should be understood that we are talking about a different legal nature of legal instruments and different scope with respect to the subjects: In the first case, it is a supranational structure, while in the second, it is a state. That said, account must be taken of the fact that in terms of EU we are talking about directives and instruments that are not directly applicable and have relevant scope in terms of subjects—EU member states. One way or another, it is not the matter of whether it is sound to compare the laws of a particular state and EU directives that plays a major role, but the subject matter, the subject of legal regulation and its agenda that could have been adopted and implemented by Kazakhstan in its national laws.

On top of that, Kazakhstan's legislation does not specifically provide for Environmental impact assessment (EIA) in a transboundary context and implementation of the Convention on the Environmental Impact Assessment in a Transboundary Context (the Espoo Convention). There is also a list of inconsistencies of the national legislation of Kazakhstan with its obligations under the Espoo Convention and the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (the Aarhus Convention). One such example is the state delegating responsibility for carrying out EIA to the customer (initiator) of the proposed activity.

However, even in view of the above, the relevant authorities and agencies have been paying inadequate attention to control over waste placement, its impact on human health and the environment in general. It should be noted that there is a gap between the systematic increase in the amount of waste, especially household waste, and the necessary measures that would be aimed at their prevention, proper disposal and neutralization (Aja & Al-Kayiem, 2014).

Clearly, establishing a reasonable balance between national and local budgets is an important element of budgetary policy both at the national and local government levels; but with decentralization of power, the issue becomes particularly relevant (Stevens & Kanie, 2016). In this regard, one should subscribe to the opinion of scientists that solutions to this issue should be searched for not only taking into account the actual business performance and actual performance of certain administrative territories, but also with due regard to the demographic, social and environmental situation in relevant territories, which

largely determines expenditures (Pandey et al., 2018). Studies that have analyzed national and local spending for waste disposal report a steady decline in the country's and local communities' engagement in investment in effective waste management (Yay, 2015). This means that funding from the national and local budgets is not always sufficient to develop the waste management industry; this involves additional significant amounts to be received both from national and foreign private investments (Aja & Al-Kayiem, 2014).

However, there is a positive trend in the new Environmental Code we discussed above, under which local executive bodies will be obliged to apply 100% of incoming environmental payments toward financing environmental measures. While only 45% of such receipts were spent on this earlier.

Many environmental stresses and risks are expected, especially if public environmental awareness is not raised and government agencies neglect environmental degradation (Carbonell & Allison, 2015). It is also worth noting that cities of Kazakhstan do not have extensive programs on integrated waste management or even on waste recycling.

Kazakhstan's classic instance reforms of legislation, by amending the existing regulations, are not competitive with the planned approach common in developed countries with powerful administrative structures. Today's huge number of small changes causes trouble for the authorized local authorities' activities; an updated legal regulation is being developed for in the first place.

Therefore, at the national level, waste management problem should be addressed primarily through the introduction of effective legislative regulation that should be developed with due regard to the national context and the positive experience of relevant European laws. With this in mind, the new Environmental Code of the Republic of Kazakhstan should contribute to solving the problem.

5 Conclusion

Waste management in Kazakhstan is a complex issue due to its imbalanced development. The regulation of household waste management is focused on recycling, at the same time, insufficient attention is paid to the regulation of modern landfills. Herewith, local governments do not pay due attention to the development of programs for integrated waste management or recycling. At the same time, the principle of extended producer responsibility is currently not fully used in Kazakhstan. An imminent problem is the issue of WEEE utilization within the framework of compliance with the Basel Convention, but in this case, the problem is peculiar not only of the legal regulation of Kazakhstan. The need to develop appropriate procedures for the proper disposal of WEEE for many countries is largely caused by the shortcomings of the Convention itself.

Adequate waste management requires an extremely complex system, including an effective collection and sorting scheme for various wastes, active participation of individuals and businesses, relevant infrastructure adapted to the specific composition of the waste and availability of the necessary funding. The analysis of European legal requirements in terms of waste management suggests that the EU aims to significantly reduce the amount of waste produced by implementing three principles: waste prevention, recycling and reuse, while also improving technologies for the final sale and monitoring. In Kazakhstan, at the current stage, such an approach is difficult to apply partly due to the inconsistency of the existing regulatory framework with the requirements of international agreements in the

field of environmental protection, as well as the lack of appropriate market instruments for waste management.

An optimal combination of state and market-based waste management instruments (based on consumer and producer responsibility) could improve the regulatory framework developed in the EU to minimize waste. To decouple waste generation from economic growth, it would be useful to apply proactive and preventative approaches to increase responsibility and participation of all stakeholders (consumers, businesses and institutions). However, it is impossible to fully implement such measures, since in Kazakhstan, mechanisms related to the implementation of EIA, public awareness and participation in environmental decision-making are being implemented to a significantly weak extent. There is also a list of inconsistencies of the national legislation of Kazakhstan with its obligations under the Espoo Convention and the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters.

Although Kazakhstan's policy does not imply the need to harmonize its legislation with the EU, the application of the approaches of the EU countries (defined in particular in Directive 2008/98 / EU, EU Directive 2018/851) can be considered as a promising model for improving national legislation on waste management.

In general, the current administration approach has been increasingly changing under globalization and the introduction of sustainable development principles in all areas of state machinery functioning and is relevant to waste management. Improving efficiency and rationalizing management, adopting new standards of the world economy, setting up a direct relationship between the legislative area and application will make it possible to significantly improve effectiveness of the existing waste management system and solve a number of pressing environmental issues in the future. It is expected that the new Environmental Code, adopted on January 2, 2021 and which should enter into force on July 1, 2021, will solve the country's waste management problem. Its provisions and the regulations to be adopted for its implementation will improve Kazakhstan's waste management system in accordance with the international obligations undertaken by Kazakhstan and bring it closer to the European level.

It is expected that these important results will help to further develop a more sustainable waste management practices in line with future environmental regulations in Kazakhstan and other developing countries having a similar situation. However, sustainability has become a key issue in alternative decision-making situations related to waste management, so the harmonious coexistence of environmental, economic and social perspectives, as well as technical issues, must always be encouraged and regulated. In this regard, further feasibility studies should be conducted to fully demonstrate the broader fitness of the waste management plan.

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Data Availability Data will be available on request.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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Authors and Affiliations

Roza Zhamiyeva[1] · Gulmira Sultanbekova[1] · Gulnara Balgimbekova[2] · Kuat Mussin[3] · Maral Abzalbekova[1] · Murat Kozhanov[4]

✉ Roza Zhamiyeva
rzhamiyeva@rambler.ru

[1] Department of Criminal Law, Procedure and Forensic Science, Karaganda Buketov University, Karaganda, Republic of Kazakhstan

[2] Department of Constitutional and International Law, Karaganda Buketov University, Karaganda, Republic of Kazakhstan

[3] Department of Theory and History of State and Law, Karaganda Buketov University, Karaganda, Republic of Kazakhstan

[4] Department of Information and computing systems, Karaganda Technical University, Karaganda, Republic of Kazakhstan