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Regulatory Obstacles in Municipal Solid Waste Management in Kazakhstan in Comparison with the EU

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Abstract: In the context of achieving the goals of the modern environmental agenda, the issue of effective management of household waste is a complex problem, being one of the highest priorities on a global scale. Regional features and the lack of effective international instruments often hinder the solution of this problem, complicating the development and application of common mechanisms. For Kazakhstan, which is the largest country in Central Asia and the state that produces the largest amount of household waste in the region, the issue of managing household waste is of particular relevance. This study is on the prospects for political and legal regulation in matters of municipal waste management in Kazakhstan within the framework of the use of foreign legal instruments and practices. Besides that, the study examines the prospects for the management of solid domestic waste in the country. Based on the study of foreign experience in the management of domestic waste, we identified the shortcomings of the existing legislative regulation in this area in the Republic of Kazakhstan. The analysis showed that the legislation of the Republic of Kazakhstan in the relevant area is at the stage of formation. At the same time, the existing problems require a comprehensive solution related to the development of an integrated approach, which implies the effective interaction of political and legal instruments. In particular, the use of national strategies and programs, integrated waste management programs, and the development of an appropriate regulatory framework for them. A review of political initiatives that directly affect the prospects for the formation of legal regulation indicated the commitment of the subjects of policy making in the field of environmental protection of the Republic of Kazakhstan to approaches based on the preference for minimizing or preventing waste generation and for the waste-to-energy principles. These initiatives are in line with the environmental policies in the EU.

Keywords: extended producer responsibility; municipal solid waste; MSW; sustainable development; waste management



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1. Introduction

MSW management issues top the global community's agenda. MSW is becoming the world's second biggest environmental problem after pollution, especially in developing economies. The situation is particularly difficult in rural areas of developing economies due to the lack of finance, technology, and information. MSW management in developing economies, including Kazakhstan, is one of the priority tasks of environmental policy. A cost-effective, efficient, and convenient method of handling this kind of waste is vital for developing economies [1]. From an environmental perspective, the harm from the accumulation of solid waste leads to an increase in pollution of the earth, groundwater, flora, fauna, and people. In addition, air pollution from landfill gas is a major driver of climate change [2]. Urbanization and the development of the food and consumer goods

sectors, leading to a steady increase in waste, are among the main barriers (either direct or indirect) to efficient MSW management in Kazakhstan. MSW constitutes a large and rapidly growing percentage of the total waste [3]. As a result, MSW accumulation in the country is one of Kazakhstan's most complicated environmental challenges in 2021, which is confirmed by Kazakhstan's UNECE (United Nations Economic Commission for Europe) international reports and the data of government-administered monitoring [4].

Serious environmental issues in Kazakhstan are an obstacle to the exercise by the country's residents of their constitutional rights, particularly the rights specified in:

- Article 31 of the Constitution of the Republic of Kazakhstan (according to which the government must protect the environment and make it people-friendly);
- Article 38 of the Constitution of Kazakhstan (which outlines the obligation of residents to treat nature and its resources with care) [5].

Of course, the issue of the implementation of human rights in a safe environment goes beyond the redistribution of national jurisdictions, while the lack of national mechanisms for the protection of such rights, or their inefficient use, makes us look for answers in international law. It should be noted that modern international regulation does not contain exhaustive mechanisms, instructions, or recommendations regarding the management of solid waste, mainly placing the responsibility for their handling on the states themselves. In this regard, the provisions of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal [6] are perhaps the only international legislative instrument to prevent the unhindered transport of solid waste, in particular to developing countries. At the same time, the mechanisms of the Convention have a limited effect, since they do not contain an effective sanction and compulsory mechanism for its implementation. One of the disadvantages of the Basel Convention is that it does not agree on a list of hazardous substances. This makes it difficult to successfully implement it, as exporting countries may not consider their waste to be hazardous [7]. Ultimately, MSW generation is difficult to fully control at the international level, as this issue will inevitably collide with issues of national sovereignty, domestic politics, internal rules, etc. Consequently, the issue of solid waste management becomes the prerogative of national institutions. Kazakhstan, following the current international environmental agenda proclaimed by the Paris Agreement and Agenda 2030, is developing a policy that takes into account the growing role of environmental protection, gradually moving away from a resource-oriented economy. Despite a number of objective difficulties that accompany this process, the role of the environmental agenda is playing an increasingly important role in the modern policy of the country. One of the landmark events of recent years, marking a change in political priorities in this regard, was the adoption in 2021 of an updated Environmental Code. The new Environmental Code of Kazakhstan, Article 13, also provides for the right of every person to a friendly environment. Articles 4 and 41 stipulate a reduction in landfilled waste and encourage its reuse in order to achieve sustainable development and protect the environment. The adjustment of state priorities in favor of the environmental agenda was reflected at the program-strategic level. According to President Nazarbayev's Kazakhstan 2030 Strategy [8], the solution of environmental issues and development of a sound environmental policy, as well as a clean and safe environment, are among the main policy priorities. Further, on the nationwide scale, the government's strategic priorities in environmental policy have been mapped in Kazakhstan's Development Strategy until 2050, presented in the President's Address to the Nation delivered in December 2012. The strategy's environmental component implies, among other things, the achievement of environmentally friendly and sustainable economic growth in the country, taking steps to maintain a friendly environment and minimize the environmental impacts [9,10]. According to Kazakhstan's 2014 Action Plan to join the ranks of the 30 most developed economies, the development and application of effective tools of waste management is among the main priorities of environmental policy [9].

At the Rio+20 Summit of the United Nations Conference on Sustainable Development, Kazakhstan presented its Green Bridge and Global Energy and Environmental Strategy regional initiatives, which won the global community's support and were included in the

outcome document of the conference. The Green Bridge initiative focuses on developing a transregional arrangement to develop eco-minded businesses that will promote environmentally friendly technologies, investments, and capital expenditures. In 2021, waste management has become a high-priority task of the Action Plan for Kazakhstan's transition to a green economy. The key objectives and targets of MSW management are set out in the new Environmental Code (which introduced the hierarchical principle in waste management) and in the Green Kazakhstan National Project (2021–2025) [11]. Moreover, for a long time Kazakhstan has been working on the proposed Waste Management Law, or the Law on Disposal of Industrial and Other Waste in Kazakhstan [12].

That the issue of waste management in the Republic of Kazakhstan is of particular importance is confirmed by the fact that the issue is presented at the political and strategic levels. Kazakhstan's policy in the field of waste management is set out in a policy document, Green Action Plan. The document focuses on the introduction of waste sorting and the development of the waste recycling sector and its products, funded by investors, particularly through public–private partnerships [13].

For Kazakhstan, which is the largest country in the Central Asian region and the state that produces the largest amount of municipal solid waste in the region, the issue of handling this kind of waste is of particular importance [4,14]. Improving and developing Kazakhstan's laws governing MSW management is one of the Kazakhstan government's high-priority tasks pertaining to environmental protection, sustainable development, and controlling climate change. Nevertheless, the policy of Kazakhstan in the field of waste management today is difficult to unambiguously characterize as a system [15]. The study of foreign experience is designed to help optimize the interaction of policy, legislative regulation, law enforcement, and the implementation of government initiatives at different levels.

Modern research concerning the political and legal aspects of MSW management is currently quite limited and usually considers the technical or environmental aspects of the problem [16–28]. At the same time, it is important to note the lack of comprehensive studies on waste sorting and studies using statistical data. Sociological research on the study of public opinion regarding policies for the management of solid waste has not been conducted in recent years. At the same time, existing studies related to policy and legislative regulation in the field of solid waste management in the Republic of Kazakhstan are devoted to such issues as the study of solid waste management practices in Kazakhstan in the cities of Astana and Alma-Ata [19], legal barriers to effective MSW management in terms of the transition to a “green economy” [20,21], theoretical issues of legal regulation of municipal solid waste in the Republic of Kazakhstan [22], analysis of the structure and content of the system of national legislation in the field of waste management [23], study of the legislative regulation of the Republic of Kazakhstan in the field of electronic waste management [24,25], and the solid waste management system and its impact on the sustainable development of the resort area in the Republic of Kazakhstan [26].

Current research involves analyzing the problems of and identifying the prospects for political and legal regulation of the issues of solid waste management in Kazakhstan in the framework of the use of foreign legal instruments and practices. Based on the study of the experience of the EU countries, this article identifies the shortcomings of the existing legislative regulation in this area in the Republic of Kazakhstan.

2. Materials and Methods

This study is based on the study of international and Kazakh regulations in the field of environmental protection and waste management, including the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Council Directive 75/442/EEC of 15 July 1975 on waste, Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste, Environmental Code of the Republic of Kazakhstan, Decree of the Government of the Republic of Kazakhstan dated 27 January

2016, No. 28, “On approval of the Rules for the implementation of extended obligations of producers (importers)”, and strategic policy documents of the Republic of Kazakhstan, “Kazakhstan 2030” and “Kazakhstan 2050”.

Using the method of political and legal analysis, we analyzed the current state, problems, and prospects for the development of the legislation of Kazakhstan in the field of MSW. Based on the study of the experience of the EU countries, we attempted to identify the shortcomings of the existing legislative regulation in this area in the Republic of Kazakhstan. In addition, we carried out a review of individual aspects of the legislative regulation and policy documents of the European Union in the field of household waste management in order to assess the applicability of foreign approaches to the political and legal context of the Republic of Kazakhstan.

3. Results

The conflict between environmental and economic interests (where the economic priorities shaped by the Soviet past have prevailed) are among the root causes of MSW management problems. MSW management is primarily a global issue. Environmental pollution has no boundaries and affects everyone on the planet. Available studies on these issues are non-systemic, and relevant laws were adopted in a fragmentary manner [27]. As a result, no common integrated management system or its regulatory arrangements have been established. Instead, significant regulatory and enforcement problems have emerged, and management communication links between responsible actors have not been established. Moreover, residents’ total disregard for the rules and lack of environmental consciousness encouraged the systemic violation of standards, rules, and regulations pertaining to waste management and sorting [26].

It is worth mentioning that contemporary researchers in different fields are generally unanimous in their opinions on waste management issues. The conflict arises in real-world contexts when the interests of businesses dominate environmental concerns. This was preceded by a long Soviet reality, with an approach based on the total disregard of rules and national economic priorities [17,28].

After gaining independence, Kazakhstan faced the question of the need to change the paradigm aimed exclusively at achieving high economic performance by developing traditional industries, including energy, hydrocarbon production, heavy industry, etc. The transition from a command–administrative economic system to a market (mixed) one required expert technical support. Subsequently, the role of providing support for representatives of business and public administration at various levels was assumed by international organizations. As it turned out, the will and ability of small- and medium-sized businesses to introduce sustainable business practices was challenged by limited resource potential and a shortage of qualified personnel and professional knowledge. Subsequently, the expert support of international donors, experts, and organizations, in particular the OECD, assisted Kazakhstan in studying the world experience in MSW management and adapting good practices—in particular EU practices and policies on MSW management—to the management and business context of Kazakhstan. At the same time, expert assistance was aimed at adapting businesses to new environmental and social standards, which go back to the sustainability term [26]. Studying the experience of the EU in matters of solid waste management, in particular the mechanisms of legislative regulation of this sphere, made it possible to more objectively assess the current state of this sphere of regulation in the Republic of Kazakhstan.

The steady increase in the level of social involvement in making important decisions, including decisions at the “grassroots” level, in the EU has become a factor in improving the process of waste management planning. An important role in this process was played by both the experience of applying technical innovations and the high involvement of the population in decision making [29].

Until the early 1970s, EU waste management laws were within the competence of EU member states. In 1975, in order to harmonize different national practices, the European

Council adopted the Waste Framework Directive (75/442/EC), which established general requirements and basic definitions (concepts and terms) in this area. The directive was reissued in 2006, and today it is in force in its latest version of 2008 under the name of Directive 2008/98/EC (EU Waste Directive). Directive 2008/98/EC has put forward the waste hierarchy principle—an approach that demonstrates the sequence of the most preferred waste management practices that ultimately reduce waste. According to this principle, prevention comes first in waste management. This is followed by reuse (preparation), recycling, and use and disposal in descending order [16].

The EU Waste Directive sets out a hierarchy of desired waste management. The best for the state, region, enterprise, or consumer is the first level: prevention of waste generation. This is followed by preparation for reuse. The next levels are the actual processing of waste or its recovery. The last, least desirable, option is the disposal of waste in landfills. This is usually resorted to only when nothing else can be done. In addition, there is also a level of burning. In a circular economy, energy from combustion must be put to good use, for example, for heating buildings. Otherwise, it will be equated to burial [16].

At the end of 2014, 36 national and regional prevention programs—different in content, objectives, and time horizons—were adopted in EU member states. The programs target households, municipalities, agribusinesses, and the mining sector. Most deal with such waste types as organic (food waste), electrical and electronic components, and hazardous waste [16].

As of today, the Waste Management System in the EU is represented by 11 directives and other documents [30].

Some of them are worth mentioning:

- Waste Framework Directive 2018/851 [21] of the European Parliament and of the Council amending the Waste Framework Directive 2008/98/EC.
- The Landfill Directive 2018/850 of the European Parliament and of the Council amending the Landfill Directive 1999/31/EC. This directive implies the extended producer responsibility principle.
- Directive 2019/904 of the European Parliament and of the Council on the reduction of the impact of certain plastic products on the environment.
- Directive 2018/849 of the European Parliament and of the Council amending Directive 2000/53/EC on end-of life vehicles; Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators; and Directive 2012/19/EU on waste electrical and electronic equipment. This lays down the rules for placing batteries and accumulators on the market and bans hazardous substances in them [17].
- EU member states use such directives to implement European norms into their national legislation. The EU waste management policy provides for a number of principles that are of a general nature, so their application and interpretation leave to the member states and candidate countries for EU membership the possibility of gradual adaptation of national documents to European legislation.

On the basis of such a clearly defined policy, a waste management system has been established in the EU member states at the national, regional, and local levels. The relevant legislative acts also provided the basis for the organization of a developed infrastructure and created the possibility of the safe collection, sorting, transportation, and processing of waste, the search for materials, and the neutralization of generated waste. In addition to 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, in Poland, based on the directives of the European Union, there are in effect the legal acts: “On Maintaining Cleanliness and Order in Municipalities” (Ustawa o utrzymaniu czystości i porządku w gminach), “On packaging and packaging waste management” (Ustawa o gospodarce opakowaniami i odpadami opakowaniowymi), “On duties of entrepreneurs concerning waste management, product fees and deposit fees” (Ustawa o obowiązkach przedsiębiorców w zakresie gospodarowania niektórymi odpadami oraz o opłacie produktowej), “Mining Waste Act” (Ustawa o odpadach wydoby-

wczych), “Geological and Mining Law” (Prawo geologiczne i górnictwo), which regulates the disposal of waste in mines, and the “Waste Act” (Ustawa o odpadach), defining the terms and basic principles of waste management as well as the methods of processing, recycling, and disposing of waste [31].

Common legislative regulation is designed to create common approaches for EU countries in matters of effective management of solid waste, bringing them to common standards; however, at the practical level, diametrically opposite situations may arise regarding compliance with such standards. There are a number of difficulties associated with the implementation of domestic norms, rules, instructions, and practices, as well as with issues of attitudes towards solid waste at the community level and attitudes towards the problem at the level of civil society. Since strategies for implementing EU directives are known to be determined at the national level and depend on many factors (levels of waste generation, technological possibilities, development of tourism as a factor in the accumulation of waste, etc.), the results achieved in the recycling of municipal waste vary widely [16].

For example, Sweden is traditionally associated with high legal awareness and a responsible approach of citizens to waste management issues. The state ranks first in the world in terms of waste management efficiency. Avfall Sverige, the Swedish Waste Management Association, established back in 1947, currently has 400 collective members, representing 99.9% of the country’s population. To reduce the number of landfills, a landfill tax was introduced in 2000. Dumping of explosive waste was prohibited in 2002, and dumping of organic waste was prohibited in 2005. At the same time, in Italy is located Malagrotta—one of the largest landfills in the EU with a total capacity of up to 60 million tons [18]. Obviously, this asymmetry goes against the SDGs, which are currently at the heart of European environmental policy. However, in general, the situation with the Malagrotta landfill is the exception rather than the rule in terms of achieving pan-European environmental goals.

The SDGs have long been a key policy issue for the EU and are therefore firmly anchored in the European Treaties (Articles 3 (5) and 21 (2) of the Treaty on the European Union) and included in key cross-cutting projects, sectoral policies, and initiatives. The Comprehensive European Green Deal as the new central policy agenda for sustainable growth provides a highly relevant role model for policy in the Central Asian region. Today, it is environmental problems that are becoming a very important factor, under the influence of which EU countries are accumulating their efforts in the direction of ensuring environmental safety and building a system of so-called “collective responsibility” for the state of the natural environment in the region. The EU is the most effective international regional organization in modern conditions with a comprehensive regime of environmental policy and international environmental management, based on the world’s most innovative systems of environmental protection measures. It can be argued that the activity of the EU in the environmental sphere, to some extent, is a model for other states and regions. It is based on the political will of governments and the support of civil society [32].

It should be noted the huge potential for support of the countries of the Central Asian region, in particular Kazakhstan, by the EU, which pays great attention to joint regional projects in the field of environmental protection. The EU has established a close connection between the actions taken by the Central Asian countries and the EU in the field of resolving the environmental problems of the region. The main principles of cooperation between Kazakhstan and the European Union in the field of the environment are defined in Art. 54 Partnership and Cooperation Agreements. According to the agreement, cooperation in this area is aimed at combating environmental degradation and includes the following priority areas: effective monitoring of pollution levels and assessment of the state of the environment; interaction of informational ecological systems of the parties regarding the state of the environment; sustainable, efficient, and environmentally sound production and use of energy; control over the quality of the aquatic environment; conservation of biological diversity of protected regions and rational use and management of biological resources; and environmental education and information [33]. Since 2015, Kazakhstan has been actively cooperating with the OECD as part of a program that helps Kazakhstan implement national

reforms and promote this agenda in society. Such collaboration, in turn, involves working towards sustainable resource management. The OECD guidelines for promoting a green economy highlight: the need to create a stable and transparent environment to promote public–private partnerships and investment, materializing Kazakhstan’s significant growth opportunities in energy processing and renewable energy; the need to revise the practice of introducing market control over sectoral prices and stimulating business involvement, introducing additional incentives for investors; and supporting technology and knowledge sharing, project development, and business participation [34]. The OECD notes that Kazakhstan has to fill gaps in the current regulatory framework to ensure compliance with measures to combat air pollution, violations of waste management and environmental regulations, and create incentives for expanding energy production from renewable sources. For example, the law on the “green economy” as such does not contain operational provisions and only provides for amendments and additions to other legislative acts on the transition of the Republic of Kazakhstan to a “green economy”, although such changes cannot affect the budget or change existing conditions for environmental issues. In addition, the Green Economy Law does not provide sufficient regulatory incentive to reduce greenhouse gas emissions and switch to alternative energy sources in areas where the largest investments are required to effectively implement the provisions of the concept [34].

Waste management in Kazakhstan is a complex problem due to its unbalanced development. The regulation of domestic waste management is focused on recycling, while at the same time, insufficient attention is paid to the regulation of the arrangement of modern landfills. Waste recycling companies do not manage and cannot achieve the expected results in terms of waste separation, in particular due to the fact that the population receives a monetary reward for the delivery of secondary raw materials to collection points. At the same time, it should be noted the improvements in the field of waste management due to the processes of the modernization of the economy; however, the waste that has accumulated over time reduces the significance of the results achieved in waste management at the present stage. The solution of the mentioned problem of accumulated radioactive and hazardous waste is a priority task at the state level, as a result of which the problematic aspects of non-hazardous waste management remain without due attention and modern regulation. The government authorities determine the policies and goals to be implemented; however, their implementation falls entirely on the local authorities and the private sector without the necessary support from the public authorities. Waste management legislation enshrines modern approaches, but everyday practice is still based on the old approach adopted during the Soviet era [31].

Turning to the regulatory context, it should be noted that Kazakhstan’s legislation governing MSW management includes the Constitution, the Environmental Code 2021, and policy documents—Kazakhstan 2030 and Kazakhstan 2050. There is much concern about the adoption of the Law “On Waste”, which would regulate, in terms of legislation, the main provisions pertaining to waste management.

The terminology of MSW management in Kazakhstan’s regulatory documents is open to dispute, as there are different wordings enshrined in the Constitution of the Republic of Kazakhstan, the Environmental Code, and the Draft Law on Waste: domestic waste, municipal household waste, municipal community waste, household waste [35], and consumption waste [36]. Different sources use different data, and this makes comparisons difficult. Furthermore, these terms are believed to be synonyms [37]. Rules for the management of municipal waste, approved by the Order Acting Minister of Ecology, Geology, and Natural Resources of the Republic of Kazakhstan dated December 28, 2021, No. 508, define municipal solid waste as municipal waste in solid form [38]. This results in a lack of unified terminology.

Considering the concept of MSW as an aggregate category, it should be noted that it is not exhaustive and, in the future, can expand to include other names of waste. In 2011, in Kazakhstan, an analysis was carried out on the composition of solid waste in nine cities of the republic. In the report on this analysis, the list of waste includes food waste, rubber, textiles, plastics, construction waste, etc. In this case, the list is also not exhaustive [39].

Obviously, MSW can contain hazardous waste. Based on this understanding, the Basel Convention is perhaps the only international document regulating the issues of solid waste management. However, in comparison with the concepts of “disposal” (used in the Convention) and “utilization” (used in the literature), the concept of “management” is broader [40,41]. In the overwhelming majority of modern sources, the concept of the “management” of waste is considered broader and includes “disposal” [42].

The Basel Convention, playing in this case the role of the main international document extending its action to the issue of waste management (waste management as a broader concept), uses the term “disposal”. That is, the Convention proceeds from the fact that wastes are substances that should be removed, are no longer suitable for use, and, as such, have lost their consumer properties. Accordingly, in terms of terminological certainty and the current environmental agenda, the scope of the Basel Convention is limited. This is especially evident in the context of the maturing commitment to the concept of the circular economy [43].

At the same time, the mechanisms of the Convention themselves, giving discretion to local authorities, can neutralize the recognition of certain wastes as hazardous. In this study, using the example of Kazakhstan, an attempt is made to analyze what regulatory and legal obstacles to the management of household waste may arise in developing countries. In the absence of more comprehensive international documents in the field of solid waste management, the Basel Convention for many countries, including Kazakhstan, is one of the main guidelines for the formation of a regulatory framework in this area. At the same time, based on the existing scope of its coverage, its effect in the conditions of Kazakhstan is limited.

Kazakhstan joined the Basel Convention in 2003, the provisions of which are reflected in the country’s internal legislative acts. In particular, a three-level waste hazard classification defined by the Basel Convention was fixed in the Environmental Code. At the sub-legal level, regulation related to the mechanisms of the Basel Convention was reflected in such acts as the Decree of the Government of the Republic of Kazakhstan dated 27 January 2016, No. 28, “On approval of the Rules for the implementation of extended obligations of producers (importers)”.

In the Conference of the Parties Guidance Document on Improving National Reporting by Parties to the Basel Convention, the Convention Secretariat notes that in many countries the competent authorities do not know exactly what types and quantities of hazardous waste are received or imported into the country and what kind of management should be applied to them. The lack of accurate and detailed information is a limitation of the awareness of state and administrative authorities. As a result, a vicious circle is set up: since the degree of threat to the environment and to health caused by inadequate management of hazardous wastes is not clearly established, appropriate measures cannot be taken, which further increases such threats [44].

During the COVID-19 pandemic, the issue of the proper management of hazardous medical waste has gained particular relevance [45,46].

In this context, in Kazakhstan, a case related to the illegal dumping of medical waste, which, obviously, was imported into the country from outside or was transported in transit and was not identified as hazardous waste, received wide publicity [47].

4. Discussion

As part of the discussion of the benefits of EU environmental policies, it should be noted that today the EU has highly complex practices covering infrastructural, managerial, financial, and socio-cultural components. As noted earlier, the system is based on a waste management hierarchy that has inverted pyramid structures, the priority of which is to prevent their generation. Through this hierarchy, the EU waste policy contributes to the use of energy and material resources in waste and thus encourages the conservation of primary resources. Member countries often develop national and regional/local waste management plans. While national waste management plans are more strategic, regional and local plans are more action-oriented; they detail current and planned collection systems, processing regimes, installations, etc. [48].

The need to use such an environmental policy tool in waste management plans has been recognized at the national level in the Republic of Kazakhstan. In 2021, a document was adopted that establishes a number of regulatory criteria for their development—“Rules for the development of a waste management program” [49]. The program is developed in accordance with the principle of hierarchy, which implies the preference for measures to prevent the generation of waste, its reuse, and the recycling and disposal of waste over burial and disposal of waste. However, today it is difficult to obtain information in the public domain on the implementation or development of integrated waste management programs at the enterprise level. At the same time, within the framework of the national project, “Zhasyl Kazakhstan”, which is a government initiative, an instruction was given to regional authorities to develop a program for the management of municipal waste in each region [50].

In addition to the problems of a regulatory nature regarding the issues of solid waste management in the Republic of Kazakhstan, there are a number of difficulties of a material and technical nature. Kazakhstan has a large deficit of waste recycling and sorting facilities, and despite the fact that the need for waste recycling is very high, today Kazakhstan (Astana) has only one waste recycling plant in the whole of Central Asia [3].

More than 100 small- and medium-sized waste sorting and recycling companies have been established throughout the country, which indicates that the state is concerned about:

- The problem of waste management;
- The need to address relevant issues;
- Understanding the opportunities and economic benefits in this sector.

Moreover, sorting lines are installed in seven major cities of Kazakhstan. There are plans to build 23 new facilities for waste sorting and recycling, and existing small-scale waste recycling plants are being upgraded in 19 settlements [3].

In recent years, Kazakhstan has repeatedly attempted to create an MSW sorting and recycling system in various regions. However, such attempts failed almost every time for a variety of reasons, with the main ones being:

- Corruption;
- Total disregard for the rules;
- Neglect by individuals;
- Poor infrastructure;
- Lack of the required regulatory framework and support of local authorities [3].

As a solution to the problem, it was suggested that sorting and recycling facilities and landfills should be either 100% state-owned or 100% private-owned. Today, however, landfills are owned and administered by the government, and waste sorting and recycling facilities are private [3]. Development of an effective MSW management system should be based on the priority to minimize or prevent waste generation, taking into account the special aspects of each of them [51]. At the same time, it is important to note that there is no regulatory framework for the implementation of these intentions.

European countries are also increasingly using research and technological innovations to recycle waste. The EU has programs supporting research and technological development in this area. Scientists, researchers, and design engineers enjoy the enabling environment for productive work, the exchange of knowledge, and the development of innovative environmental products for waste sorting and recycling. One such innovation, waste-to-energy technology, makes possible not only the safe disposal of solid waste but also the recovery of energy from the recycling process, which is required for other purposes [52].

In November 2020, the Law on Amendments and Additions to Some Pieces of Legislation of the Republic of Kazakhstan on Energy, Transport, and State Awards [53] introduced the concept of energy waste disposal—a process of thermal treatment of waste in order to reduce its volume and generate energy. Therefore, the innovative technology is at such a high level that steam is the only byproduct released as a result of waste incineration at high temperatures with special catalysts. This technology can provide up to 50 MW per hour of

alternative electricity. Plants in Hong Kong, Spain, France, Germany, the United States, and Switzerland operate under this scheme. In total, there are more than 243 such incinerators in Europe [53].

The current waste management system in Germany is one of the most advanced in the world. The levels of treatment of various wastes are well above the European average. More than 90% of MSW is recycled, while for Europe in general this indicator averages 37%. The overall recycling rate of various materials in Germany exceeds 80%. In 2016, 68% of paper, 94% of glass, and 45% of steel was made from recycled materials [54].

Kazakhstan is studying the case of the waste recycling plant in Vienna, Austria, which has operated since 1971 on the waste-to-energy principle, utilizing up to 250 thousand tons of waste annually and producing 60 MW of thermal energy and 120 GWh of electricity. Another well-known facility is the Amager Bakke plant in Copenhagen, Denmark, which opened in 2017 and recycles 400 thousand tons of waste per year, which provides heat and electricity to 160,000 and 62,500 households, respectively [54].

In EU countries, the primary sorting function is passed to waste producers, and only afterwards is the final sorting carried out at recycling plants [55]. This approach achieves a high level of waste recycling by increasing the purity and homogeneity of the inputs. Those wastes that cannot be recycled are usually sent to landfills or incinerated. The waste management practices of some countries are presented below. Austria is a top performer, recycling 63% of the generated waste. According to the Austrian Constitution, the responsibility for solid waste is divided between the federal and local governments. Sorting and treatment are legislated and mandatory for every region of the country [55].

Landfills are a traditional and cost-effective way of handling household waste in Kazakhstan. Disposal methods include surface landfill, sanitary landfill, and safe landfill. However, the landfill-based technology can lead to a large number of environmental impacts, including air, soil, and groundwater contamination. Therefore, more recycling is needed both in Kazakhstan and the entire world.

There are several approaches to solving the problem of the recycling and disposal of plastic waste. It is worth mentioning that globally only approx. 9% of plastic waste is recycled, and approx. 12% is incinerated. As a result, heavy metals and CO₂ are released into the air. Moreover, most MSW can be recycled and used as resources and inputs for new products that may be in demand on the market. These are mainly rubber and plastic products, glass, paper, fabric, and other materials.

Unfortunately, not all official dumpsites in Kazakhstan are located at a safe distance from residential areas nor have appropriate insulation and wastewater collection and treatment systems. As a result, harmful substances often enter the soil and groundwater.

In Kazakhstan, at the moment, liability for landfills in Article 505 of the Code of Administrative Offenses is represented by an administrative fine (“Violation of the rules for the improvement of the territories of cities and settlements, as well as the destruction of infrastructure facilities, the destruction and damage to green spaces of the city and settlements”). Considering the potential harm, the amount of the fine is disproportionately small at only USD 6–12 [56].

It is worth noting that the new developments in the legislation of Kazakhstan contribute to the improvement in the regulatory arrangements for MSW management in the country. Waste management operations as well as waste sorting requirements are defined in the Environmental Code 2021. Article 350 of the new Environmental Code establishes environmental requirements for landfills. In accordance with the norm, it is prohibited to dispose of municipal solid waste without preliminary sorting. Each landfill must be equipped with a monitoring system for leachate and wastewater generated in deposited waste in order to prevent their negative impact on the environment. Municipal solid waste landfills should also be equipped with an emissions (landfill gas) monitoring system [57].

The 2021 edition of the Code changed the procedure for calculating environmental damage, as well as the very concept of damage. In accordance with the new rules, environmental damage will be compensated only in kind and through measures to restore the

environment. Such an approach should exclude cases of the recovery of damages without evidence of the fact of its infliction, as is done now.

It should be noted the emergence of mechanisms for assessing transboundary impacts that will be applied in cases where the activity, plan, or program of a foreign state may have a significant adverse impact on the territory of the Republic of Kazakhstan, and vice versa, when similar documents planned on the territory of the Republic of Kazakhstan may have such an impact to the territory located outside its jurisdiction. These norms are aimed at the implementation of the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo). The participation of Kazakhstan in this convention provides an opportunity for citizens and state bodies of our state to prevent or mitigate possible significant adverse environmental impacts on Kazakhstan resulting from the action of foreign sources.

Regarding innovations, a new method of calculating an administrative fine should be noted, namely, as a percentage of the economic benefit (i.e., savings or income) received as a result of an administrative offense. For example, for violation of the ban on the disposal of certain types of waste, a fine is imposed in the amount of 100% of the economic benefit received as a result of the offense [58].

At the same time, the issue of legislative regulation faces challenges of proper enforcement and of an operational nature. For example, Article 365 of the Environmental Code of the Republic of Kazakhstan 2021 (Environmental requirements in the field of municipal waste management) provides for informing the population about a rational system for the collection, disposal, and processing of municipal solid waste, including separate collection. However, within the framework of this study, it was not possible to identify integral state programs to inform the population and increase the environmental awareness of the population.

Thus, in discussing the management of solid waste in Kazakhstan as a problem requiring integrated solutions, we can consider the development of a new approach to the legislation on the management of solid waste. First, we should point out the sophisticated management of different types of waste. Second, a synergy between the private, research, and public sectors is required to implement an effective waste management strategy. There is a need for a common waste management policy, which would be regulated by a system of interrelated and non-conflicting regulations.

In this case, the coordinated collaboration of public authorities; NGOs; research institutions; small, medium, and large businesses; and the private sector to create common regulatory arrangements is of particular importance [59]. Solving the problem of effective MSW management requires:

- Sustainable economic relations;
- Consistency of solutions;
- Balance of interests of economic agents [51].

Moreover, a number of issues need to be addressed comprehensively. First, the situation with the enforcement of the pieces of legislation governing waste management should be monitored. Second, a broad information campaign is needed to educate and raise public awareness of the problem. Finally, no less important is the market for recyclables.

It is also worth mentioning that significant steps have been taken in Kazakhstan to implement an advanced waste management policy. According to the Action Plan for Kazakhstan's transition to a green economy, waste recycling should reach 40% by 2030 and up to 50% by 2050.

In order to create effective regulatory mechanisms for the treatment of MSW in Kazakhstan, a systematic approach is needed. To achieve this, it is critically important not only to create a regulatory framework and standards that meet current requirements but also to implement information, advocacy, and educational campaigns with the country's residents to develop an understanding of the importance of the proper sorting and recycling of MSW. The successful implementation of MSW management approaches is possible only with the proactive attitudes of the country's households and NGOs.

5. Conclusions

Based on the results of this study, it should be noted that at present the legislative regulation of the Republic of Kazakhstan in the field of solid waste management is faced with such issues as the lack of unified terminology regarding the definition of certain types of waste and the presence of a number of state strategic programs that are poorly integrated into the legislative context. A number of problems are of a complex nature. To date, there are no comprehensive waste management programs, the development of which was provided for by state policy documents. Some legal norms today are, of course, weakly applicable. For example, at present there is a lack of comprehensive state programs to inform the population and increase its environmental awareness, the need for the implementation of which is provided for by the Environmental Code. In comparison with EU regulation, there is no regulatory framework in the Republic of Kazakhstan regarding the development of waste management planning programs. Liability for organizing landfills is disproportionately low in relation to potential damage and is set at the level of an administrative fine, which cannot be an effective preventive measure. At the same time, the existing problems require a comprehensive solution related to the development of an integrated approach, in particular, the use of waste management programs that are mutually integrated with the current legislation. As part of the improvement in environmental legislation, obviously, the legislator in the near future will have to face the issue of changing the legal form and ownership of sorting and processing facilities and landfills.

Perspective improvements in the legal regulation in the MSW scope in Kazakhstan may be connected with the peculiarities of the further factual requirements of the business for the improvement in the regulatory base, proceeding from the challenges that entrepreneurs may face in practice. Further, it is important to hold awareness-raising campaigns (with a special focus on innovations) through workshops and educational and training programs for workers, students, and government employees. Otherwise, legislative developments run the risk of being pretentious.

Summing up, despite significant overall progress in ensuring the regular removal of MSW in Kazakhstan, the issue of MSW requires comprehensive approaches to legal enforcement in this field. In this context, adoption of the Bill on Waste (which has been in progress for more than a year) is of high priority. Besides legislative obstacles, Kazakhstan needs to raise its residents' awareness of the daily sorting of MSW, thus promoting environmental consciousness. Poor infrastructure also significantly hampers effective waste management. The development of effective steps to control unauthorized dumpsites deserves special attention. In view of the particular importance of the latter issue, there are good reasons to believe that comparative studies of Kazakhstan's regulatory issues and global practices should lay the foundation for future research.

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