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Strategic Priorities and Challenges of Environmental Management in Kazakhstan

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Abstract

The problem of sustainable ecological and economic development has been always relevant, and it is particularly relevant nowadays. Ecological safety of any state and improvement of living conditions today is largely related to the intensive socio-economic changes taking place in the country, as well as to the quantitative and qualitative changes in the environment caused by the impact of key industries. The purpose of this study is to develop recommendations for the organization and implementation of environmental management system through the industrial-innovative development, with the view of improving environmental protection in production and in other sectors of industry. Environmental problems are caused by pollution of the environment, air, etc. Under these circumstances, it is extremely important to solve ecological problems by conducting new studies in management, taking into account modern standards. This should be the paramount task in providing high quality of life and

maintaining the ecological balance, which should be based on a comprehensive assessment of both production enterprises and companies engaged in other economic sectors, taking into account their versatility. Therefore, relevance of environmental tasks for both industrial enterprises and companies engaged in other economic sectors is steadily increasing. Research results justify the need to provide rational use of natural resources under current conditions, which should be combined with the maximum possible environmental preservation through technology improvement and minimizing harm to human health. The authors consider that improvement of environmental and economic situation demands the elaboration of 'clean' production.

Keywords: Environmental Management, Environmental Protection, sustainable development, economic modernization, modern technology.

JEL Classifications: I15, O13, Q55.

Introduction

Rapid economic development of the modern world leads to ecological and environmental degradation, as well as to the increasing health risk. Production emissions, animal waste, toxic chemicals and fertilizers as well as car emissions have a negative impact on the environment in any country.

In terms of Kazakhstan, environmental conditions determine the ability to use its rich natural resources as well as health quality and life expectancy of the population. Consequently, under current Kazakh conditions, problems associated with the need to carry out scientific research and to develop strategies aiming at the improvement of environmental management are of great importance. This requires new approaches to the design and implementation of mechanisms for solving environmental and economic problems related to resource management, and other sectors of the economy under current Kazakh conditions.

Significant contributions to the economic assessment of environment-oriented systems and control elements were made by A.A. Gusev and I.G. Gusev (1996), V. Danilov-Danilyan and K.S. Losev (2000), T.A. Trifonova (2005), S.M. Mukauly (2007), Z.K. Kargazhanov (2010), M.A. Tleubergen (2008) and other scholars examined the issues of industrial environmental management under current conditions of the Republic of Kazakhstan.

1. Literature Review

Presently, the problems associated with insufficient scientific substantiation and development of strategies aimed at the improvement of environmental management in Kazakhstan are of great importance (Freedman and Neuzil 2015, Vlasova *et al.* 2016). They require thorough theoretical research, comprehensive analysis and development of sound recommendations for environmental management. These circumstances determine not only relevance of research subject, but also the fact that the above problems have been insufficiently studied in the present economic context. In turn, this requires new approaches to the design and implementation of mechanisms for solving ecological and economic problems of environmental management in Kazakhstan.

Problems related to environmental management predetermined a number of studies related to theoretical aspects of environmental management and their role in economic stabilization (O'riordan 2014); determination of the most significant environmental factors influencing the operation of industrial enterprises in Kazakhstan and their subsequent consideration in strategic management (Toktar 2016); the analysis of environmental situation in the Republic of Kazakhstan (Thomas 2015); the impact of investment on environmental protection as regards all types of investor's regional economic activities (Schoenherr 2012); the level and cost-efficiency of environmental protection related to each type of environmental protection activities (Mitchell 2013); environmental aspects of the existing control systems in the Kazakh enterprises (Suleimenova *et al.* 2014); development of a world market for 'environmentally friendly' products and environment-oriented production in agriculture (Goloshevskaya 2011); environmentally friendly building materials and their efficiency during implementation in production (Borisov 2007); determination of priorities in the development of environmental management in Kazakhstan (Malik 2014).

Therefore, the purpose of this study is to develop recommendations for the organization and implementation of environmental management system through the industrial-innovative development, with the view of improving environmental protection in production and in other sectors of industry.

Practical significance of this paper is determined by the fact that the developed theoretical principles and recommendations could be used in the implementation of environmental management at industrial enterprises with the view of making their production and management environmentally friendly. The paper should contribute

to the improvement of environmental management of both Kazakhstani industrial enterprises and their counterparts in other countries, thereby improving the efficiency and competitiveness of production, and providing their ecological and economic sustainability.

2. Method

Specific problems of environmental management required using a number of economic research methods: monographic method, calculation and constructive method, result-oriented and abstract-logical methods, expert assessment. The authors also used theoretical research methods, such as comparison and generalization, scientific abstraction, and synthesis. Quantitative and qualitative research methods, such as comparative method and systems analysis, were used to consider current environmental management trends in Kazakhstan.

3. Results

3.1. Main trends and problems of environmental management under the current economic conditions in Kazakhstan

The authors studied the main indicators that characterize the impact of economic activities on the environment and natural resources. Studies of pollution sources for 10 years showed that emission levels of the most common air pollutants related to stationary sources in Kazakhstan significantly increased (2002-2007) and then decreased (2008 – 2011). The emitted amount of solid, gaseous and liquid substances decreased. For example, the emission level of sulfur dioxide decreased from 1132 to 774, *i.e.* almost by 1.5 times. However, the emission level of nitric oxide and carbon monoxide increased from 176 to 233 and 378 to 401, *i.e.* by 32.3% and 17.7%, respectively.

The authors analyzed emission of hazardous substances into the atmosphere by stationary sources in Kazakhstan regions. The analyzed data (Table 1) indicate that two-thirds of the country's gross emissions enter the atmosphere mostly from three regions: Karaganda, Pavlodar and East Kazakhstan.

Table 1. Levels of atmospheric emissions by stationary sources (%)

Regions of Kazakhstan	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
The Republic of Kazakhstan	100	100	100	100	100	100	100	100	100	100
Akmola Region	1.37	1.48	1.85	2.68	2.85	3.08	3.27	3.32	1.26	3.67
Aktobe Region	4.34	5.66	6.81	7.02	7.90	9.4	5.63	5.12	5.20	5.49
Almaty Region	2.31	2.30	2.46	2.14	2.58	3.07	3.36	3.11	2.69	2.99
Atyrau Region	3.06	3.01	3.26	2.14	4.03	4.32	4.39	4.57	5.58	6.06
West Kazakhstan Region	3.11	2.57	1.79	1.62	1.59	2.14	2.61	2.38	2.60	2.64
Jambyl Region	0.58	0.64	0.68	0.73	1.09	0.73	0.87	1.06	1.70	1.47
Karaganda Region	48.57	47.68	44.61	43.43	37.52	29.65	29.70	29.46	26.90	25.08
Kostanay Region	4.44	3.38	4.04	3.97	4.02	4.78	5.14	4.66	4.22	4.95
Kyzylorda Region	0.74	1.35	1.24	1.25	1.31	1.46	1.30	1.35	1.30	1.36
Mangystau Region	1.91	2.13	2.28	2.23	2.33	2.77	3.08	3.23	2.69	3.39
South Kazakhstan Region	1.03	1.24	1.33	1.37	1.53	1.72	1.83	2.00	2.03	2.46
Pavlodar Region	18.44	18.76	19.95	19.74	22.57	24.17	25.71	26.94	28.34	28.49
North Kazakhstan Region	2.1	2.21	2.27	2.38	2.76	3.35	3.49	3.28	3.17	3.11
East Kazakhstan Region	6.11	5.59	5.40	5.71	5.73	6.43	6.60	6.27	5.87	5.47
Astana	1.48	1.48	1.52	1.53	1.65	2.44	2.52	2.70	2.72	2.65
Almaty	0.41	0.52	0.51	0.52	0.54	0.49	0.51	0.49	0.50	0.54

Source: compiled by the authors according to the data provided by the Kazakhstan Statistics Agency.

The Karaganda Region, characterized by the highest levels of man-induced pollution, encompasses all the biggest centers of atmospheric pollution (cities of Balkhash, Jezkazgan and Temirtau). In the Pavlodar Region, which is the second region in terms of pollution levels, Aksu, Pavlodar and Ekibastuz cities are the ultimate sources of pollution. Rapid industrialization causes environmental problems in the East Kazakhstan Region – the third region in terms of pollution levels, where smelting of titanium, magnesium, lead, and zinc cause highly toxic emissions (cities of Ust-Kamenogorsk and Ridder).

Currently, Kazakhstan is making a push into capturing and processing pollutants (Table 2).

Table 2. Captured and processed pollutants (thousand tons)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
The Republic of Kazakhstan	21,329.3	21,656.4	23,116.6	23,802.4	24,262.0	24,448.6	25,858.4	28,036.2	31,012.0	33,378.7
Akmola Region	262.1	363.0	448.4	452.3	361.4	453.4	517.1	440.3	330.5	503.2
Aktobe Region	76.2	71.6	76.7	84.5	108.9	79.7	104.4	64.3	148.0	156.4
Almaty Region	794.5	763.9	722.2	679.0	682.9	967.8	1,051.4	1,117.3	1,199.0	1,243.1
Atyrau Region	2.4	0.1	35.0	9.0	0.5	3.5	0.2	0.2	0.1	0.7
West-Kazakhstan Region	3.4	11.3	9.3	12.4	1.4	3.5	6.6	13.8	24.2	34.8
Jambyl Region	98.7	98.3	192.2	199.9	137.3	91.7	143.9	732.9	1,156.0	2,125.3
Karaganda Region	5792.2	5409.5	5731.9	5659.3	5406.3	5727.3	6035.2	6666.1	6580.0	6839.6
Kostanay Region	907.9	964.3	975.2	1,215.1	1,100.3	991.2	1,049.5	979.9	965.3	854.7
Kyzylorda Region	1.3	0.6	0.6	0.4	0.5	0.3	0.3	0.5	05	1.8
Mangystau Region	0.1	0.1	0.4	0.1	5.7	2.7	4.6	5.7	4.5	4.9
South Kazakhstan Region	131.5	174.3	160.8	143.2	65.9	37.2	57.0	81.9	83.0	75.9
Pavlodar Region	10,834.7	10,929.3	11,991.4	12,323.6	13,167.0	12,863.3	13,435.3	14,261.2	15,487.0	17,327.5
North Kazakhstan Region	651.8	662.4	695.8	703.4	820.9	841.6	911.1	967.6	961.3	991.7
East Kazakhstan Region	1,073.3	1,482.6	1,298.0	1,385.3	1,306.2	1,257.0	1,342.0	1,338.0	2,577.2	1,599.7
Astana	621.2	615.9	661.3	815.3	984.1	1,043.0	1,119.1	1,286.1	1,432.0	1,569.3
Almaty	78.0	109.2	117.4	119.6	112.7	85.4	80.7	80.4	63.4	50.1

Source: compiled by the authors according to source data.

The total volume of works in this area during 2004 – 2013 increased from 21,329.3 to 33,378.7 thousand tons, *i.e.* by 1.56 times. Statistical data, provided in Table 2, show that Karaganda and Pavlodar regions lay emphasis on this issue since these regions are characterized by the highest emission levels of hazardous substances into the atmosphere by stationary sources. The government of Kazakhstan allocates huge funds to provide capturing and processing pollutants in these regions. The said regions, including the East Kazakhstan Region, account for approximately 80% of captured and processed pollutants.

Nowadays, the Kazakh government allocates more funds to provide different kinds of environmental protection. For example, according to the data provided by Committee on Statistics of the Republic of Kazakhstan, in 2012, all expenditures for environmental protection amounted to 196,458,926.7 thousand tenge,

including: air protection and climate change – 58,841,143.4 thousand tenge (29.95%); wastewater treatment – 55,938,336.7 thousand tenge (28.47%); waste handling – 42,276,896.4 thousand tenge (21.49%); protection and rehabilitation of soil, groundwater and surface water – 24,243,902.7 thousand tenge (12.34%), research and development – 7,834,775.7 thousand tenge (3.99%), etc..

The authors also analyzed the distribution of investments in environmental protection by regions in 2008-2012 (Committee on Statistics of the Republic of Kazakhstan, 2013). These data show that the total amount of investments in environmental protection increased rapidly. During the analyzed period, the total amount of investments in environmental protection increased from 49,811.805 to 75,148.706 million tenge, *i.e.* by 1.5 times. The largest amount of investments was allocated to the Atyrau Region and the Pavlodar Region (21,920.334 thousand tenge and 14,551.825 thousand tenge, respectively), while the smallest amount was allocated to the South Kazakhstan Region and the North Kazakhstan Region (784.740 thousand tenge and 366.455 thousand tenge, respectively).

In sum, one can say that despite long-term studies devoted to this problem, management and recycling of industrial waste is still inadequate. The authors studied and provided data on processing of pollutants captured by treatment facilities (Table 3), which show that their volume increased by 3.2 times in 2009-2013. Their percentage of the total volume of captured and processed pollutants increased from 13.5% to 32.1%, which indicates a positive trend (Committee on Statistics of the Republic of Kazakhstan, 2014).

Table 3. Processed pollutants, captured by treatment facilities

	2009	2010	2011	2012	2013
Total, thousand tons	3,302.0	6,432.4	6,922.5	8,774.9	10,730.1
as a percentage of the total volume of captured and processed pollutants	13.5	24.9	24.7	28.3	32.1

Source: Committee on Statistics of the Republic of Kazakhstan (Committee on Statistics of the Republic of Kazakhstan, 2014).

Despite a sufficient number of solutions, relevance of this problem is determined by an increase in the level of production and accumulation of industrial waste.

The problem of land pollution by toxic and carcinogenic substances released by the mining, metallurgical and power industries became especially relevant in recent years. Consequently, current environmental problems, caused by a man-induced overload and irrational use of natural resources, affected the state of the soil cover in the territory of the Republic of Kazakhstan. Therefore, the impact of environmental factors on agriculture was studied.

Presently, one can witness intensive development of a world market offering 'environmentally friendly' products, which covers all areas of production and services. Diversification of products is essential for developing 'environmentally friendly' products, monitoring production processes, producing power from unconventional sources, and using biotechnology in the food industry (Borisov 2007). Implementation of environmentally friendly production in agriculture should be based on new scientific and technical concepts, and the rational use of resource potential, with the view of reducing the man-induced impact on the environment. Today, successful development of environmental management at domestic enterprises will significantly promote stability of the agrarian economy of Kazakhstan (Goloshevskaya 2011).

Environmental problems in agriculture are becoming increasingly important, since rationalization of agricultural land use in Kazakhstan is becoming more complicated. Preservation and improvement of soil fertility requires a comprehensive approach.

Further development of agricultural production in Kazakhstan should be focused on a long-term development of an environmentally, economically, and socially balanced ecosystem, rather than on making immediate profit. Therefore, organic farming today is one of the most important and fast-growing areas, since only environmentally friendly products can satisfy the demand for natural products, while preserving nature for future generations.

The authors of this paper believe that revival of the Kazakh economy requires considerable investment in environmental innovation, which can produce both economic and social effect. Formation of a new vision of social

development requires unconventional approach approaches adapted to modern trends with due regard to regulatory instruments of environmental-economic systems.

Environmental despoliation is caused by the lack of economic interest in environmentally friendly products and by the lack of funds allocated for environmental protection projects. Today, environmental management can be considered as a practical basis for providing a 'cleaner' production.

Implementation of environmental management systems in Kazakhstan provides a broad range of advantages. These include environmental improvement, reduction of costs by means of efficient use of resources, building external confidence in the activity and products of companies, improvement of public environmental culture, raising investment attractiveness, etc. Therefore, the government stimulates companies with ISO 14001 certificates (Environmental Management Systems), for example, reduces fees for pollutant emissions. Such stimulation takes into account high levels of resource and ecological intensity of the national economy and therefore, it is very important and necessary for Kazakhstan. Incorporating environmental suggestions will also provide higher competitiveness of agricultural products.

The authors of this paper analyzed the state of environmental management systems by the example of LLP 'AK Ordasy Corporation' (2008-2013). 'AK Ordasy Corporation' has been constructing a number of civilian objects in Almaty, South Kazakhstan, Jambyl and Kyzylorda regions.

The activities of 'AK Ordasy Corporation' in the field of environmental protection are aimed at taking decisive actions to meet international standards. This corporation and its related companies implemented a high-quality management system that takes into account the environmental aspects of products. They also increased industrial standards, improved technical discipline and minimized consumption of material and energy resources.

'AK Ordasy Corporation' has a facility, which produces aerated concrete products. This facility operates in accordance with ISO 14001 requirements. Environmental friendliness, low thermal conductivity, light specific weight, fire resistance, and many other properties allowed aerated concrete to become a high-quality building material (for example, bricks).

The use of aerated concrete allows saving substantial heating costs. Vapor permeability of cellular concrete ensures quick removal of construction moisture from the material and maintenance of normal air conditions inside buildings. Air permeability helps keep fresh the air inside buildings. Therefore, aerated concrete is bio-resistant, aerated concrete buildings are fireproof and, most importantly, environmentally friendly.

The introduction of environmental management systems is very important in terms of integration into the world economic system. Furthermore, it will contribute to finding comprehensive solutions of such important socioeconomic problems of Kazakhstan as sustainable economic development and environmental sustainability.

3.2. Priorities of Environmental Management Development in the Republic of Kazakhstan

Kazakhstani enterprises are interested in providing food security by growing vegetables under cover. Production of metal structures for the construction of greenhouses is a promising sector in the South Kazakhstan Region's greenhouse industry, which plays an important role in the implementation of food programs. 'AK Ordasy Corporation', through its subsidiary LLP 'Zero Max KZ', organized production of galvanized pipes and auxiliary materials for the construction of greenhouses.

The main advantages of 'Zero Max KZ' greenhouses include:

- Environmental friendliness and safety, crop yield – twice a year;
- Thermal or air heating;
- Drip irrigation, etc.

Modular buildings are among the environmentally efficient products of the construction industry in Kazakhstan. The factory, which specializes in constructing wooden modular buildings was commissioned by LLP 'AK Ordasy Building', designed and constructed by Penn Lyon Housing Systems (USA).

The factory meets the latest requirements to energy efficiency of production by incorporating certain innovations of Penn Lyon Housing Systems.

According to experts, modular house building is the most environmentally friendly and efficient method of constructing detached, low-rise houses etc. Moreover, since the modules are built at a factory, their quality meets the latest and highest standards at the lowest possible price, and enables their application under the climatic conditions of Kazakhstan. The production of modular houses mostly uses local raw materials.

Modular house building was awarded the Energy Star for reliable cold, heat, moisture, and noise insulation, which, by contrast to other technologies, can satisfy consumer demand in terms of all parameters, such as heat saving, construction time, various options for interior and exterior decoration, and, most importantly, construction costs.

3.3. Recommendations for Improving Strategic Priorities in the Environmental Management Regulation in the Republic of Kazakhstan

Based on the analysis and study of world practices, the authors developed the following recommendations:

(1) Development and implementation of various types of industrial technologies in strategic areas;
(2) Development of technological capacity with a view to ensuring further development of the country, which is directly linked to the implementation of sustainable, environmentally friendly and cost-effective technologies in manufacturing, energy development, etc.;
(3) Introduction of modern agricultural technologies, aimed at the development of environmentally friendly products;
(4) Implementation of modern science-based methods of preservation and restoration of the landscape and biological diversity, which should be sufficient to maintain natural regulation and compensation of man-induced impact;
(5) Implementation of an ecosystem (watershed) principle that primarily considers respective ecological systems as a subject of development, with a view to ensuring sustainable development of the Republic of Kazakhstan.

4. Discussion

Kazakhstan presents an industrialized region with typical environmental, economic and social problems. Ecological safety of Kazakhstan and the improvement of living conditions are largely related to the intensive socioeconomic transformations, quantitative and qualitative changes caused by the environmental impact of key industries. Today, the problem of the global environmental-economic system should be considered as the basis for an innovative approach to the development of environmentally friendly production. In order to overcome the existing negative trends in the development of ecological situation, environmental management should be considered as a practical basis for the establishment of a 'cleaner' production. The problem of land pollution by toxic and carcinogenic substances released by the mining, metallurgical and power industries became especially relevant in recent years. Consequently, current environmental problems, caused by the man-induced overload and irrational use of natural resources, affected the state of the soil cover in the territory of the Republic of Kazakhstan. Sraubaev *et al.* (2014), considers the possibility to improve the ecological situation by means of legal instruments. However, proceeding from this research and the international experience (O'riordan 2014) the situation requires not only legislative amendments, but also global investment in environmental management, which will improve the ecological situation and stimulate economic and technological development in this area.

Conclusion

In the modern context, prudent use of natural resources should be combined with the maximum possible preservation of the environment by improving technology, reducing emissions, conducting full decontamination, minimizing the potential damage to human health, life, and production means. Therefore, protection of natural resources and their rational use are important for the environmental management system in Kazakhstan.

Presently, one can witness intensive development of a world market offering 'environmentally friendly' products, covering all areas of production and services. For example, low thermal conductivity, light specific weight, fire resistance, and many other properties made aerated concrete the high-quality building material. Most countries try to develop greenhouse business, since growing plants under cover does not depend on weather and climatic conditions, while crop yield significantly increases. Construction of such greenhouses will significantly improve the country's food security.

The production of wooden modular houses by 'AK Ordasy Building' presents the most environmentally friendly and efficient method of construction along with its lowest possible cost and short construction time.

Nowadays, Kazakhstan faces the fundamental task of economic modernization within the framework of technical and technological structural reforms that ensure the emergence and extensive use of competitive production, based on new environmentally friendly management practices.

References

[1] Borisov, V.Y. 2007. The impact of industrial innovative activity on resource saving. *Environmental Economics*, 5: 122-126.

[2] Danilov-Danilyan, V.I., and Losev, K.S. 2000. *Environmental Challenges and Sustainable Development*.

Moscow: Progress-Tradition. 416.

[3] Environmental protection and sustainable development of Kazakhstan. 2013. Statistical book, Committee on Statistics of the Republic of Kazakhstan. Astana. 182.

[4] Freedman, E., and Neuzil, M. 2015. *Environmental Crises in Central Asia: From Steppes to Seas, from Deserts to Glaciers*. London: Routledge. 213.

[5] Goloshevskaya, I. S. 2011. Production of environmentally friendly goods: the present and the future. In I.S. Goloshevskaya, O.V. Agafonova (Eds.). *Young Scientist,* 4(1): 145-148.

[6] Gusev, A.A., and Gusev, I.G. 1996. Environmental and economic problems of sustainable development. *Environmental Economics*, 1: 4-17.

[7] Kargazhanov, Z.K. 2010. *Fees related to using natural resources*. Almaty: ALT. 163.

[8] Kazakhstan in 2011. 2012. *Statistical Yearbook of the Committee on Statistics of the Republic of Kazakhstan.* Astana. 496.

[9] Kazakhstan in 2013. 2014. *Statistical Yearbook, Committee on Statistics of the Republic of Kazakhstan*. Astana. 484.

[10] Malik, O.P. 2014. *Management of environmental problems in Kazakhstan and Uzbekistan: comprehensive security prospects*. 125.

[11] Mitchell, B. 2013. *Resource and Environmental Management*. London: Routledge. 178.

[12] Mukauly, S.M. 2007. *Environmental-Economic Issues of Regional Development in Kazakhstan*: Almaty. 123.

[13] O'riordan, T. 2014. *Environmental Science for Environmental Management*. London: Routledge. 253.

[14] Regions of Kazakhstan in 2010. 2011. *Statistical book, Committee on Statistics of the Republic of Kazakhstan.* Astana. 405.

[15] Regions of Kazakhstan in 2013. 2014. *Statistical book, Committee on Statistics of the Republic of Kazakhstan*. Astana. 420.

[16] Review data of LLP 'AK Ordasy Corporation' during the period 2008-2013. 432

[17] Schoenherr T. 2012. The role of environmental management in sustainable business development: a multi-country investigation. *International Journal of Production Economics*, 140(1): 116-128.

[18] Sraubaev, E. N., Serik, B., Erdesov, N. J., and Shintaeva, N. Y. 2014. The State of Fuel and Energy Complex of the Republic of Kazakhstan and Related Major Environmental Problems. Medicine and Ecology 1: 23-30.

[19] Suleimenova, N., Filipova, M., and Sandugash, Z. 2014. Environmental and Economic Problems of Agroecosystem under Agricultural Intensification in Southeastern Kazakhstan. *Journal of Scientific and Applied Research,* 6: 54-59.

[20] Thomas M. 2015. Social, environmental and economic sustainability of Kazakhstan: a long-term perspective. *Central Asian Survey*, 34(4): 456-483.

[21] Tleubergen, M.A. 2008. Efficiency of comprehensive use of mineral resources of Kazakhstan: *Economy*. 137.

[22] Toktar, M. 2016. Ecological restoration in contaminated soils of Kokdzhon phosphate mining area (Jambyl Region, Kazakhstan). *Ecological Engineering*, 86: 1-4.

[23] Trifonova, T.A. 2005. Environmental management. Moscow: Academic Project. 320.

[24] Vlasova, V. K., Kirilova, G. I., and Curteva, O. V. 2016. Matrix Classification of Information Environment Algorithms Application in the Educational Process. *International Electronic Journal of Mathematics Education,* 11(1): 165-171.