Management in the system of waste utilization of production and consumption

U I Azimov¹, I R Gilmanshin¹,² and D R Krainova¹, I A Galeev¹

¹Kazan Federal University, 18 Kremlyovskaya street, Kazan, 420008, Russian Federation
²Kazan National Research Technical University named after A.N.Tupolev, 420111, Kazan, Russia

Is-er@yandex.ru

Abstract. The main problems of waste management in accordance with the legislation are considered in the article. The economic benefits of separate waste collection are listed. The necessity of transition to a new level of waste management in the Republic of Tatarstan is determined.

The intensive increase in the volumes of formation and accumulation of production and consumption wastes (including communal and industrial waste), with a parallel increase in the share of artificial polymers in the morphological composition of the waste, caused a crisis and predetermined the problem of ensuring environmental safety in the sphere of waste management. The systemic nature of the problem is linked to the issues of the economic efficiency of the allocation and utilization of very significant amounts of valuable secondary resources that are part of the waste. Also, the issues of formation of understanding of sustainable development, moral and ecological education of the population are actualized [1, p.112].

In a sustainable development strategy, waste should be considered as a residue of production and consumption, suitable for further use or processing.

In fact, the majority of waste categories, both industrial and domestic, contain 40-60% (and sometimes 80%) of the most valuable types of secondary resources, including waste paper, glass, polymeric waste, metals, etc. Dynamics Changes in the quantitative and qualitative composition of waste categorically predetermine the need to adopt new approaches and solutions in the management of waste management.

Federal Law №458 of December 29, 2014 "On production and consumption wastes" establishes the basic principle of the theory and practice of waste management. Waste is treated as an object of ownership, which accordingly provides for the right to license activities in the field of handling them.

Priorities in the field of waste management:
- waste treatment;
- recycling;
- waste neutralization.
Proceeding from the presented principle of organization of the waste management procedure, the main tasks of the management at the regional level are the application of scientifically grounded technologies in securing the recycling of secondary resources extracted from waste through development, both investment attractiveness and activation of small business.

The economic and environmental benefits of using secondary raw materials in comparison with production based on primary resources are presented in Table 1.

| Indicators                                      | Aluminum | Steel | Glass | Paper |
|------------------------------------------------|----------|-------|-------|-------|
| Saving energy                                  | 90-97    | 47-74 | 23-71 | 4-32  |
| Expenditure of additional types of             | 90       | -     | 80    | 35-40 |
| resource components                            |          |       |       |       |
| Saving of water resources                      | -        | 40    | 58    | 50    |
| Reduction of air emissions                     | 95       | 85    | 74    | 20    |
| Reducing the discharge of pollutants into      | 97       | 76    | 35    | -     |
| water bodies                                   |          |       |       |       |
| Reduction of waste generation                  | -        | 97    | -     | 80    |

From the indicators presented in the table it becomes obvious that recycling of secondary resources with the selection of the latter from wastes determines not only the economic efficiency of large-capacity production, but also of small and medium-sized businesses, determining the opening of new jobs and ensuring employment of the population.

For the branch economy, the selection of secondary resources from waste products, in particular from domestic waste, is the opportunity to provide raw materials to enterprises. For example, providing the paper mill in Naberezhnye Chelny with high-quality waste paper is a condition for the stability of the production process, a way to diversify the industry, and increase profitability. And as a result of implementing complex measures for reclamation of existing landfills, it is possible not only to eliminate hazardous and carcinogenic emissions of landfill gas into the atmosphere, but the generation of heat and electricity in cogeneration mode [2, p.42].

The transition to a new level of system organization of the procedure for handling waste products of production and consumption should be justified by motivational principles that ensure the activation of economic activity in expanding the attractiveness of the recycling procedure for secondary resources allocated from production and consumption wastes.

As an effective mechanism of motivation in the management of secondary resources, one should focus on improving the system of institutional economy. The most effective principle of motivation is economically justified indicators for the purchase of secondary resources, or the establishment of economic and legal indicators of the tariff scale for garbage disposal, depending on the depth of selection of secondary raw materials from waste generated by waste owners.

A classic example of this mechanism is the establishment of a reasonable price for the purchase of secondary metal (today black metal is 8-10 rubles / kg) determined 100% collection of secondary raw materials. Also, since 2016, in connection with the increase in the cost of purchasing secondary cardboard and paper products to 5-8 rubles per kilo, the collection of recyclables has increased dramatically both by large operators and by individual entrepreneurs.

The model of consumer behavior in the choice of the technological method of managing waste management can be described as a function of the usefulness of the procedure for separate waste collection in the form of an additive relationship:

\[
U(\vec{x}) = \sum_{j=1}^{n} a_j \times x_j^{b_j}
\]
where the price estimate of the efficiency indicator of the accepted waste management process - $U(\bar{x})$ is produced as a generalized indicator of the additive sum of partial indices $\bar{x} = (x_1, x_j, x_n)$. As private indicators, it is necessary to establish indicators of economic, ecological efficiency, changing social security with the representation of parametric coefficients $a_j, b_j$ in relative numerical ratios.

Thus, a rational variant of management in the field of waste management of production and consumption is the transition to separate collection directly within their owner, as well as the construction of an integrated waste management system in all life stages, including disposal and disposal.

References
[1] Azimov Y I, Gabirov R F 2009 The concept of recycling in the tasks of minimizing the consumption of natural resources II International Ecological Congress (IV International Scientific and Technical Conference) "Ecology and life safety of industrial transport complexes" pp 113-14
[2] Gilmanshin I R, Kashapov N F, Azimov Y I, Gilmashina S I, Ganeeva D A, Valishov R D 2015 Utilization of biogas from landfills of solid household waste by building an energy complex based on alternative energy facilities Kazan economic bulletin 2 (16) pp 41-45
[3] FL №458-FL of 29.12.2014 "About production and consumption wastes"