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Volunteer model in the field of waste management

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Subject. The studied issue is associated with the failure of waste management reform in Russia. The waste management sector is suffering from underfunding of the waste management infrastructure by the state and private investors, incomplete implementation of separate waste collection, and the acute environmental hazards of landfills and dumps. All these factors indicate that the issue requires a bottom-up approach, starting with households, as that is where the whole process of municipal solid waste management begins. Therefore, it is relevant to study the possibilities of engaging households in the ecologically optimal process of separate waste collection with the help of volunteers.

The purpose of the study was to substantiate the expediency of involving volunteers in informing, training, and encouraging households to sort waste. The volunteer movement in Russia is actively developing in many directions, including environmental protection. Environmental volunteers are involved in planting forests, cleaning up polluted lands and water reservoirs, working in nature reserves, and carrying out environmental education activities, including separate waste collection.

The research methodology includes the methods of household surveys, modelling of volunteer mass movement, sensitivity analysis, and predicting the achievability of the targets for separate collection and accumulation of municipal solid waste (MSW) in accordance with Russia's development goals up to 2030.

Results. We modelled the elasticity and quantitative growth of households willing to switch to separate waste collection under certain conditions. One of the conditions is the involvement of volunteers in public awareness activities on optimal waste management. Our calculations showed that the number of households that would adopt separate collection could increase by 38 %, taking into account all the incentives. This would make it possible to meet the national goals for this area by 2030.

Discussion. Models of volunteer activity were developed in related scientific disciplines: sociology, pedagogy, and psychology. Economic models use value estimates of the contribution of volunteering to the added product, human capital of the organisation and the individual. The novelty of the author's approach is to model volunteering in relation to waste management, it fills a gap in economic research relating to the phenomenon of volunteering.

Keywords: municipal solid waste, separate collection, sensitivity analysis, Republic of Khakassia, household behaviour.

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Introduction

One of the key obstacles to the implementation of waste reform in Russia is the lack of funding, both from the government and from private investors. The industry requires 500 billion roubles to be invested in its infrastructure by 2030. However, according to the Ministry of Natural Resources and Environment, investments for 2019–2020 amounted to 28 billion roubles only. According to the Russian Environmental Operator, investments for 2021–2022 amounted to 26.4 billion roubles. Thus, the underfunding over the past four years was more than 70 %.

Extended Producer Responsibility (EPR), which obliges producers and importers of goods to recycle and dispose of manufactured or imported products at the end of their life cycle, when they lose their consumer properties, was to be introduced from 2022. However, the due date for the introduction of the EPR system has been postponed to 2024, which also impedes the creation of an effective system for the return of secondary material resources into economic circulation as part of the transition to a circular economy.

The non-mandatory nature of separate waste collection remains a significant obstacle to waste management reform. Separate collection has only been included in the policies of 39 regions of the Russian Federation. As a consequence, environmental damage from waste disposal is accumulating. Without recycling, a large proportion of valuable reusable materials are being lost. Moreover, it leads to an increase in waste transportation costs due to greater volumes, and accordingly, an increase in utility tariffs for waste collection.

Given the insufficient MSW management by the government, it seemed appropriate to investigate how households could be involved in the environmentally friendly process of separate collection with the help of volunteers.

Households have a special role in the study of waste management because of the nature of the process, as they are the source of waste. In a closed cycle of waste management, households are also

the main beneficiaries of waste management, the benefits being the minimisation of environmental damage from landfills and dumps and the reduction of waste disposal tariffs (Subrakova, 2021). Nevertheless, separate waste collection is not widespread, not only because of the lack of infrastructure, but also because of the lack of knowledge, skills, and motivation for such activities.

The low awareness of residents is aggravated by the fact that there are a huge variety of types, classes, and categories of municipal solid waste, some of which can be recycled, while others cannot, at least for now. For example, there are 7 types of plastics used in the production of many goods and packaging materials: polyethylene terephthalate (PET), low pressure polyethylene (LDPE), polyvinyl chloride (PVC), high pressure polyethylene (HDPE), polypropylene (PP), polystyrene (PS), and others (O). Despite labelling, the types of plastic are difficult to distinguish for the untrained person. For recycling, it is very important to ensure that each type is collected separately, it is clean, and in some cases, preferably, of the same colour.

Food waste should be separated as a priority so as not to contaminate other types of waste, and sent for composting, anaerobic digestion, or other, more uncommon uses. For processing into compost, the selection of raw material constituents and the absence of foreign substances are also critical. Each MSW fraction has specific features, depending on the morphological composition, seasonal variations, development of recycling technology, etc. Therefore, there cannot be universal recommendations and instructions for separate collection. Therefore, various detailed guidelines need to be designed and promoted in each region and municipality.

As noted in the article (Motorin, 2021), the awareness strategy for the separate waste collection system should be aimed at promoting the idea of separate waste collection and advising the population about it. It is necessary to design a strategy that would make the system more open and transparent and guarantee its functioning.

Public environmental organisations promote separate waste collection among people, develop guidelines for the public, and interact with the business community and the authorities. However, such activities do not cover the whole country. The expansion of promotional, informational, training, and educational work by public and volunteer organisations is a necessary element of the overall transition towards an ecologically friendly environment.

Objectives

The aim of the study was to substantiate the expediency of involving volunteers in informing, training, and persuading households to adopt separate collection of municipal solid waste. Environmental volunteers in Russia are actively involved in planting forests, cleaning up polluted lands and water reservoirs, working in nature reserves, and carrying out environmental education activities, including separate waste collection.

In order to achieve the objectives of the study, the following tasks were set: 1) to analyse models and practices of volunteer activities in separate waste collection in Russia and in foreign countries; 2) to develop a questionnaire and conduct a survey of households on separate waste collection; 3) to develop a model of volunteer activities in waste management; 4) to assess the effectiveness of involving volunteers in information and advisory work in the field of separate waste collection.

Research methodology

The research methodology includes a survey of households to obtain data on the intention to adopt separate waste collection under certain conditions, the level of awareness, and the preferred means of informing. Mass volunteering was modelled taking into account the sensitivity coefficients and the targets for separate collection and accumulation of MSW until 2024.

Models of volunteering were provided mainly in sociological, pedagogical, and psychological studies. They include a model with resource, semantic, and external components, as well as personal benefit models including an investment

model and a consumer model. In addition, there is a public goods model and corporate partnership models, etc.

Economic models of volunteering consider the phenomenon as a productive activity, as labour that generates added value. There are three approaches to assessing the economic effect of volunteering: a) by substitution costs; b) by alternative income; c) by estimating the social approval of the provided benefits (Mersiyanova, 2018).

Modelling volunteering in relation to waste management is a new approach, it fills a gap in economic research on the phenomenon of volunteering. The challenges in food waste management are, first, the lack of data on the actual volumes and composition of waste in general and food waste in particular, second, the reluctance of households to change their behaviour, and third, the need to optimise the methods of food waste treatment. Thus, we believe that volunteers, along with government and commercial entities, should be actively involved in the process of creating a new culture of household waste management.

Results

Volunteers are keen to respond to the unresolved problems of the society, which include the reformation of waste treatment. Typically, they tend to behave in a way that is aimed at overcoming the difficulties and inertia of everyday life, improving and developing themselves and people around them, even if it is most likely not a mainstream concern.

Research into volunteering revealed that the definition of volunteering is still debatable. The phenomenon is an unstable, relativistic construct that involves different institutions (state, public, and corporate) in its construction and management (Shachar et al., 2019). Government and corporate entities are becoming more involved in the development of volunteering in certain areas. Social security programmes are adopted, which provide social benefits under the condition of participation in volunteer work or community service.

Given the indirect relations between established behavioural patterns and the need to change them in the area of waste management, volunteers face a challenging task of promoting behavioural change. To build an algorithm for the internal transition to new attitudes and behaviour, an integrative MOAB (motivation, opportunity, ability, behaviour) model was proposed. It explains the contribution of persuasion, assessment of outcomes, and social norms in fostering pro-environmental behaviour in waste management (Kalyanasundaram et al., 2021). The model establishes an inverse relationship between behaviour and persuasion directly or through ability. The relationship shows that when a behaviour becomes a habit, then the persuasion and the assessment of the outcomes of that behaviour can be revised towards stronger attitudes. The activities of volunteer organisations are characterised by “social capacity”, defined as the ability of people to work together to organise social relations,

rather than shift the responsibility for these relations entirely to state institutions or the flux of market exchange (Lichterman, 2009).

Table 1 provides data on the number and distribution of volunteers in Russia in 2016 and 2019, according to the Analytical Centre under the Government of the Russian Federation.

As can be seen from the figures, the largest increase in the number of volunteers were in the areas of environmental projects (187.9 %) and the landscaping and cleaning of residential areas (188.8 %). The shares of volunteers participating in these activities also increased by 8.9 and 0.5 percentage points, respectively (while the share of four other activities decreased and the share of the other two remained the same). This demonstrates an increase in the popularity, attractiveness, and relevance of environmental activities.

However, Russian environmental organisations do not pay much attention to organic MSW. The reason is that the current regulations classify food waste as mixed waste, not subject

Table 1
Number and distribution of volunteers by type of activity in Russia in 2016 and 2019

Type of activity	2016		2019		Growth rate, %
	Number, thousand people	Share, %	Number, thousand people	Share, %	
Social work	559.6	39.0	655.9	36.5	117.2
Landscaping and cleaning	229.6	16.0	431.3	24.9	187.9
Helping animals	100.4	7.0	147.4	8.2	146.8
Providing any assistance for free	71.7	5.0	115.0	6.4	160.4
Organising sports, cultural, and other events	86.1	6.0	107.8	6.0	125.2
Participation in the work of public bodies of institutions and organisations	71.7	5.0	102.4	5.7	142.8
Fundraising for a charity or other social projects	100.4	7.0	75.5	4.2	75.2
Construction, renovation, and restoration	57.4	4.0	61.1	3.4	106.5
Assisting a local school	45.9	3.2	71.9	4.0	156.7
Environmental projects (clearing forests, fields, and rivers, planting trees)	14.3	1.0	27.0	1.5	188.8
Agriculture (farm and field work)	14.3	1.0	17.9	1.0	125.2
Search for missing people	14.3	1.0	16.2	0.9	113.3
Other	57.4	4.0	109.6	6.1	190.9
Total	1,434.9	100	1797.1	100	125.3

to recycling, along with contaminated food packaging and personal hygiene products. The majority of regional programmes also consider organic waste as a non-recyclable type of waste. Therefore, it is not treated by local waste management services. Its management is not covered by the existing infrastructure, except for sending to landfills and burial as part of mixed waste. In the face of the COVID-19 pandemic, all countries have reduced their requirements for separate collection of MSW (Subrakova, 2021), however, in Russia the reformation has continued. For example, on July 1, 2020, the Government of the Russian Federation ordered a roadmap be developed for separate waste collection. The Methodological Recommendations for Separate Storage and Collection of Municipal Solid Waste for the regional executive authorities were approved on October 26, 2020. However, the separate collection of MSW is still a recommended measure rather than an obligatory stage of waste management. It is no coincidence that only 39 regions of the Russian Federation have made provisions for measures to introduce separate waste collection in their waste management programmes.

Many countries have experience of involving volunteers to solve the issues of waste management. In India, for example, where the scale of urban and rural pollution threatens the health of more than a billion people, volunteer education and counselling activities have shown positive results. These activities have resulted in an increase in the number of households involved in the separate collection and proper handling of waste (Kalyanasundaram et al., 2021). Researchers determined that waste management and recycling in India are gender-specific, class and caste also play a crucial role in the social arrangement of reproductive labour (Luthra, 2021). As shown in the study (MacKenzie et al., 2015), volunteers themselves described their experience as strengthening team relationships, giving a sense of being useful to others, expanding their knowledge of the environment, safety, and health, as

well as providing financial benefits and experience for future employment. The article (Sadeghi-Niaraki et al., 2020) describes the algorithm for processing the database of waste management irregularities in Seoul. The city residents detect and voluntarily add such cases to the database via smartphones to facilitate remedial action. According to the authors, this system has helped to increase responsibility and ensure direct public involvement in waste management. In Dhaka, a similar initiative was implemented. The GeoWeb smart waste management system works with the information provided by the city's residents, allowing for closer contact between citizens and local authorities and increasing public awareness of waste management (Labib, 2017). An analysis of good practices that contribute to reducing the waste problem in Russia showed a variety of approaches that are used in combination with each other. It also demonstrated the involvement of not only households as the main actors, but also non-profit organisations (Shabanova, 2019).

A survey of residents of the capital of Nepal showed that 88 % of households segregate waste into biodegradable and non-biodegradable, and most of them compost organic waste (Rai et al., 2019). An analysis of household waste composition and management in Sweden showed that 35 % of waste can be avoided, which would reduce greenhouse gas emissions and provide greater benefits in the context of global warming than the common methods of incineration and anaerobic digestion (Bernstad Saraiva Schott & Andersson, 2015). A comparative study on the costs of separate waste collection carried out in Portugal revealed that the separate collection of organic waste does not imply an overall increase in the costs of the service. It may even reduce them if more than 40 % of the population are involved in the system (Gomes et al., 2008).

The results of our study are based on the data from the household survey and sensitivity analysis. We designed a questionnaire and distributed it to the residents of the Republic of Khakassia.

The questionnaire included 14 questions: 3 questions on personal information, 4 questions on the assessment of the current state of waste management, and 7 questions on their intention to participate in separate waste collection, preferred channels to obtain information, and adopted methods of waste management. A total of 210 questionnaires were returned, and the survey showed the following results. The majority of respondents were women, urban dwellers living in apartment buildings, which was in line with the demographic structure of the population of the region: According to the Rosstat data for 2022, 70 % of the residents of the Republic of Khakassia were urban dwellers, 56 % were women, and 59.3 % lived in apartment buildings. 34 % of respondents were engaged in waste sorting in some way, and an equal proportion intended to do so in the future. This group includes 7 % of people who would sort waste if there were containers for separate waste collection nearby, 6 % who would sort their waste if there was a reduction in tariffs, 8 % who would sort waste if there were collection points, 5 % who required advice from volunteers, 4 % who would adopt waste sorting if they had free time, and 4 % who would sort waste if they had storage facilities at home. 32 % of the respondents did not intend to participate in separate waste collection. 95 % of the respondents rated their awareness of proper

waste management as insufficient, and only 5 % considered themselves sufficiently aware. Among the outreach channels, 9 % chose consultations by volunteers, while others preferred the traditional options: leaflets, brochures, social advertising, and mass media. The above mentioned 9 % segment is very important for the research and essential for its results. Table 2 presents the results of the questionnaire survey among the residents of the Republic of Khakassia, representing different socio-demographic groups of the population.

The results showed that the share of the region's residents who practised SWC was 33.8 % (compared to 48 % in Russia, according to the Romir Research Holding), and there were 32.4 % of the residents who did not intend to adopt SWC (versus 12 % in the Russian Federation). The difference between the regional results and the national average data can be explained by the absence of recycling facilities in Khakassia, except for waste paper recycling, and the predominance of landfill disposal as a method of waste management. Separate collection and storage of MSW has been adopted only in urban areas and only for some types of waste. Interestingly, a positive attitude towards separate collection was expressed by 67.6 % of the residents of Khakassia (in Russia it was 88 %). The most important condition for the respondents

Table 2

Results of a survey of residents of the Republic of Khakassia on separate waste collection (SWC)

Parameters	Number of people	Parameters	Number of people
Total number of people surveyed	210	Total respondents for SWC awareness assessment	210
including those practising SWC	71	including those not aware of SWC	67
Intending to participate in the future	71	insufficiently informed	133
if there are containers available	15	sufficiently informed	10
if the tariffs are reduced	12	Participants who gave their opinion on preferred outreach channels	132
if there are waste collection points	17	including by leaflets, announcements	12
if there are consultations provided by volunteers	10	brochures	32
if they have spare time	9	publications in the printed media	28
if there are household storage systems	8	social advertising on radio, TV, and Internet	48
Now willing to adopt SWC	68	consultations by volunteers	22

who intend to practise SWC in the future was the availability of waste collection points (23.9 %), containers near their homes (21.1 %), as well as lower tariffs for waste disposal (16.9 %). Among the motives for SWC, the respondents named: concern for the environment (38.2 %), saving costs (36.3 %), and trying to be like everyone else (25.2 %). The obtained results are consistent with the research data (Chu et al., 2016) according to which the technological changes have the greatest influence on the separate collection of MSW. They are followed by the political and economic factors, and the social and cultural factors influence separate waste collection to the least extent.

The survey gave insight into the influence of several factors which, according to the respondents, can contribute to the transition to separate waste collection (SWC). The questionnaire asked to evaluate the following factors (conditions): reduction of tariffs – i_1 ; accounting and payment for waste disposal according to the actual volume of MSW – i_2 ; receiving detailed instructions and consultations – i_3 ; availability of means for home recycling and storage – i_4 ; spare time for SWC – i_5 ; containers for SWC – i_6 .

Using the sensitivity analysis technique, we determined the elasticity coefficients (1), which show how the number of people engaged in SWC will change under the influence of a particular factor:

$$E_{X_i} = \frac{\Delta Y}{Y_0} : \frac{\Delta X}{X_i}, \quad (1)$$

where E_{X_i} is the sensitivity coefficient of the number of households to the i -th factor,

$\frac{\Delta Y}{Y_0}$ is the total increase in the number of households, %, and $\frac{\Delta X}{X_i}$ is the increase in the number of households due to the i -th factor, %.

Based on the elasticity coefficients, we determined the incremental values of the number of households (2) that intend to switch to separate waste collection:

$$Y = Y_0 + \sum_{i=1}^n \Delta X_i, \quad (2)$$

where Y is the total number of people engaged in separate MSW collection, Y_0 is the number of households currently engaged in separate MSW collection, and ΔX_i is the increase in the number of households practising separate collection of MSW under the influence of the i -th factor.

The results of the sensitivity coefficient calculations are presented in Table 3.

The most effective factors for attracting residents of the region to separate waste collection were economic aspects (reduction of tariffs, paying for the actual volume of waste), followed by technological factors (availability of containers). The factor of providing more comprehensive information was also relevant, the corresponding elasticity coefficient was 1.7. Thus, if we inform and advise households about proper waste management along with the provision of technical and economic conditions, we can expect an increase in the proportion of households practising SWC by 38 % to 71.8 %. Under the above conditions, the targets of the national development objectives set by the Presidential Decree, in particular, to introduce separate waste collection to 68.4 % of the

Table 3

Sensitivity coefficients

Sensitivity coefficients	i_1	i_2	i_3	i_4	i_5	i_6
of the number of participants in separate waste collection under better conditions	2.8	3.1	1.7	1.6	1.5	1.9
Sensitivity coefficients	j_1	j_2	j_3	j_4		
for the number of participants in separate waste collection when consulted by volunteers on certain issues	0.5	0.3	0.5	0.4		

population by 2024, and to 100 % by 2030, will be well within reach.

Then we calculated the elasticity coefficients of the number of households practising SWC under the condition that volunteers provide them with information and consultations. The calculations showed that technological issues (what waste can be collected and processed at home and how to do it – j_1, j_3), economic aspects (conditions of tariff reduction – j_4), and organisational issues (further processing and control of SWC – j_2) are also of interest for the respondents. These results are important for the development of volunteer training programmes and the methods for their activities. According to the experience of organising volunteer activities in the field of waste management in other countries (Hellwig et al., 2019), it is important to engage appropriate volunteers, to train and guide them with respect to their motivation and the specifics of their work.

Using the Russian Environmental Operator's targets to increase the rate of MSW sorting from 27 % in 2020 to 50 % in 2024, with further improvement for organic waste from 0 to 27 % in 2024–2030, we calculated the sensitivity coefficients of the number of volunteers for each factor from 1.7 to 3.1. The resulting figures showed that volunteer activities may have significant impact on the progress of waste sorting and waste management in general.

Discussion

As no similar studies have been conducted, we assessed the results in terms of representativeness and applicability. The sample of 210 respondents for the survey on the research subject can be considered representative, as it includes all groups of the population: by gender, age, and place of residence. The data were obtained from a simple random sample of respondents. The total and sample populations are characterised as being homogeneous, i.e. they have similar characteristics due to the fact that they belong to the same region and period of the study. One of the indicators characterising the behaviour of the population in relation to the studied topic is the proportion of

residents who intend to undertake waste sorting in the future under certain conditions (71 % according to our survey, an earlier study in another region of Russia showed 66 % (Aladyshkina et al., 2014)). The authors (Chen & Lee, 2020; Khan et al., 2019) found, however, that despite the conditions imposed by the authorities and enterprises, the people who said they wanted to participate in the programme never actually did so. The reasons why actual behaviour deviates from intentions are due to a complex set of external and internal motivations. Their mutual influence results in pro-environmental behaviour.

The number of volunteers as an impact indicator is related to the sensitivity coefficients j_n calculated in Table 2. Using formula (2), we calculated the required number of volunteers, 142 people. Since the exact number of households in the country and in the regions would only be known after processing the data of the All-Russian Population Census of 2021, we calculated the conditional number of households based on the average size of a household in Russia, 2.6 people (2010), and the population of the Republic of Khakassia, 532,036 people. Thus, the total number of households was 204,600. In this case, there were an average of 1,437 households per volunteer. However, it is not necessary to provide all households with information and counselling services at the same time. Therefore, if volunteers start with the urban population of the republic (70 %), the load is reduced to 1,000 households, which is achievable in a reasonable period of time.

Conclusions

Based on the results of the research, the following conclusions were drawn.

1. Lack of public awareness of the importance of separate waste collection and how to do it is one of the obstacles to the implementation of the MSW management reform in Russia. This is due to the poor information policy in this area, the diverse and constantly changing composition of MSW. In addition, regional waste management operators are not interested in the implementation of environmentally friendly approaches.

2. Environmental volunteers, according to the research hypothesis, can contribute to enhancing the environmental consciousness of households and changing behavioural habits in waste management. The theoretical basis of our hypothesis is the integration MOAB model (motivation, opportunity, ability, and behaviour). It explains the contribution of persuasion, results evaluation, and social norms in fostering pro-environmental behaviour in waste sorting.

3. Domestic and international experience in the development of volunteer activities demonstrates the effectiveness of educational, advisory, and informational activities of motivated and properly trained volunteers. Their efforts resulted in an increase in the number of households practising separate waste collection and proper handling of municipal solid waste.

4. Models of volunteering were developed mainly in sociological, pedagogical, and psychological studies. Modelling volunteering in relation to waste management, taking into account the sensitivity coefficients, is a new approach, it fills a gap in economic research on the phenomenon of volunteering.

5. A sample survey of the residents of the Republic of Khakassia showed that at the time of the study, 34.0 % of the respondents participated in waste sorting, 33.8 % intended to do so in the future (most of them would do it if there were accessible sorted waste collection points), and 23.2 % did not intend to participate. 5 % of the respondents assessed their awareness of proper waste management as sufficient, 6.3 % as insufficient, and 32 % as completely unaware. The respondents named the following preferred channels for providing information on waste management issues: social advertising on TV,

radio, and Internet – 27 %, leaflets, brochures, and printed media – 56 %, and volunteer consultations – 17 %.

6. In the study, we determined the factors contributing to the transition to separate collection as an effective model of waste management: reduction of municipal tariffs, payment for services by the actual volume of disposed waste rather than the set level, detailed consultations, availability of funds for household storage and recycling of MSW, availability of containers for separate collection, and spare time for waste sorting. Considering these factors, we modelled the increase in the number of households that intend to adopt separate collection practices.

7. The calculated sensitivity coefficients of the number of people participating in separate collection showed that economic factors (reduction of tariffs and accounting for the actual volume of waste) were the most effective, the technological factors came second, and the awareness factor was also very important for the result. The combined impact of all factors, according to our calculations, makes it possible to increase the proportion of households participating in separate collection to 71.8 %.

8. The results of the calculation of the sensitivity coefficients of the number of volunteers for the selected factors showed that the targets of the national development objectives set by the Presidential Decree, in particular, to increase the share of separate waste collection to 68.4 % by 2024 and to 100 % by 2030, are achievable.

Conflict of Interest

The author declares the absence of obvious and potential conflicts of interest related to the publication of this article.

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**Экономика, организация
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**Модель волонтерской деятельности
в сфере обращения с отходами**

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Предмет. Проблема исследования обусловлена ситуацией провала мусорной реформы в России. Недофинансирование государством и частными инвесторами инфраструктуры индустрии обращения с отходами, неполнота реализации принципа раздельного сбора отходов, острота экологической опасности полигонов и свалок – все это свидетельствует о необходимости решения проблемы снизу, с домашних хозяйств, поскольку с них начинается весь процесс обращения с твердыми коммунальными отходами. Поэтому представляется целесообразным исследовать возможности вовлечения домашних хозяйств в оптимальный с экологической точки зрения процесс раздельного сбора отходов с помощью волонтеров.

Цель исследования – обоснование целесообразности привлечения волонтерского движения, которое в России активно развивается во многих сферах, в том числе в экологической, к информированию, обучению, убеждению домохозяйств. Экологические волонтеры участвуют в акциях посадки леса, очистки загрязненных территорий и водоемов, работают в заповедниках, занимаются экологическим просвещением населения, в том числе по раздельному сбору отходов.

Методология исследования включает метод анкетирования домашних хозяйств, моделирования массовости волонтерского движения, аналитический метод чувствительности и прогноз достижения плановых параметров по раздельному сбору и накоплению ТКО в соответствии с национальными целями до 2030 г.

Результаты исследования. Составлены модели эластичности и количественного прироста домохозяйств, намеренных перейти к практике раздельного сбора отходов при определенных условиях, в том числе при подключении волонтеров к информационно-разъяснительной работе по оптимальному обращению с отходами. Расчеты показали, что количество домохозяйств, практикующих раздельный сбор, может увеличиться за счет всех факторов на 38 %, что позволит достичь национальных целей по данному показателю к 2030 г.

Обсуждение результатов. Модели волонтерской деятельности разрабатывались в смежных научных дисциплинах: социологии, педагогике, психологии. В экономических моделях используют стоимостные оценки вклада добровольчества в добавленный продукт, человеческий капитал организации и индивида. Новизна авторского подхода состоит в моделировании волонтерского движения применительно к сфере обращения с отходами и восполняет пробел в исследовании феномена волонтерства в экономике.

Ключевые слова: твердые коммунальные отходы, отдельный сбор отходов, анализ чувствительности, Республика Хакасия, поведение домашних хозяйств.

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Конфликт интересов

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