

Marketing communication in the context of the optimal model of the national pattern system of waste management in Ukraine

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Abstract. The issue of rational waste management in Ukraine is quite acute. The system is in a state of decay, because about 94% of waste ends up in landfills and, at the same time, has a negative impact on the environment. That is why the issue of building a perfect management system and applying marketing communications in Ukraine is quite relevant, because proper waste management with the help of marketing measures will not only save the environment, but also attract secondary raw materials to energy or further production. The purpose of this work was to research and generalize the aspects of marketing communications in the context of the optimal model of the national pattern system of waste management in Ukraine. The research used a system method, an analysis method, and complex and integrative methods. It was determined that the level of volumes of generated and accumulated waste in Ukraine is quite high. It has been established that it is necessary to develop and improve measures for the disposal of acid, alkali or salt waste, other mineral waste, chemical waste, industrial waste sludge, ferrous metal waste and mixed and undifferentiated materials. Necessary waste disposal measures have been determined, which in turn should provide an opportunity to organize complex waste processing measures and ensure the use of their energy potential. The marketing communications established in the study will help to implement measures to stimulate recycling enterprises by the state, to establish relationships between producers and consumers of secondary products, to provide informational support for waste processing through the media, to create a marketing complex around secondary products and to reproduce the use of secondary products in energy efficiency. The recommended structure of marketing communications for running a waste management business in Ukraine will bring recycling to a new level and increase its efficiency. The practical significance of the study is that the identified waste disposal measures and accompanying marketing communications can be used in Ukraine to improve the effectiveness of the waste management system

Keywords: marketing communication; waste management; advertising; trends; transformation of social values

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INTRODUCTION

The environment is in a permanent system of a closed cycle, which in turn is accompanied by the transition of substances from one state to another. The functioning of economic processes is based on the circulation of resources, which consists in their production, use and generation of waste. Since the 2010s, the issue of waste management has intensified, because imperfect management in this area has a negative impact on the environment. M.O. Barinov *et al.* (2021) determined that the rational management of waste is quite important today, because it can not only be destroyed, but also processed and used as raw materials for subsequent sales products. Waste management is considered by the authors as a systematization of waste management methods and measures, which should primarily be the most favorable for the environment. At the same time, waste management should take place as close as possible to the source of its generation, prevent environmental risks, have large-scale efficiency, ensure the independence of disposal processes and be based on joint responsibility.

Waste management at the global level is one of the biggest challenges. A. Saad *et al.* (2022) believed that quality waste management can be a means of reducing the destruction of human health and nature. The increase in population, together with economic growth and development of consumption, is accompanied by an increase in the volume of waste worldwide. The expansion of the world economy, the industrial revolution and cultural development are accompanied by an increase in goods, which in the future also become the main factors in the growth of waste volumes. Accordingly, against the background of climate change, problems with the global accumulation of waste are emerging.

G. Odhiambo (2022) also supported the view that unsystematic and ineffective waste management can lead to the accumulation of garbage and increase the level of environmental pollution. In the future, it is expected to reduce the negative impact on the environment of the poorly developed waste management system. E. Taelman *et al.* (2018) established that it is very difficult to recreate the improvement of waste management, because environmental, economic, social, geographical spheres of activity must be involved in this direction.

Companies that provide waste disposal services are business structures and, accordingly, need marketing activities for development. R. Patel (2023) found that in today's competitive market, it is marketing that plays an important role in shaping the success of a waste disposal company. In accordance with the development of environmental awareness of consumers, the pickiness in choosing waste disposal services is increasing. In addition, a waste management business owner can differentiate their own services and create a brand of reliable

and trusted supplier according to the industry. Effectively implemented marketing also helps to increase customer loyalty and retain them. By communicating the value of their services and engaging with existing customers through various marketing channels, a waste disposal company can build strong and long-lasting relationships with them. Accordingly, such measures will allow you to retain the client base and expand the volume of referrals, which in the future will be a major factor in the long-term growth and success of the waste disposal firm (Patel, 2023).

O. Kayode (2022) determined that targeted interaction with customers using mass media (for example, direct mail, television, newspapers and magazines, radio, Internet, billboards, etc.) is carried out at the expense of marketing communications. That is, there is an exchange of information about the products and services of waste disposal organizations between them and the recipients. After all, before positioning the product in the mind of the buyer, it is necessary to first build awareness with the help of an advertising set to such a level that the buyer creates a positive image of both the services themselves and the entire waste disposal company (Kayode, 2022). That is why there is a need to organize effective sales of waste disposal services through the development of marketing communications.

The purpose of the study was to analyze current trends in waste management in Ukraine and to identify directions for improving marketing communications in the context of the optimal waste management model.

METHODS AND MATERIALS

The theory and research methodology are based on the main studies of scientists from Ukraine, the United States of America, the Arab Emirates, Great Britain, Japan, Germany, Spain and Portugal regarding the development of marketing communications in the waste management system. The research used a systematic method to determine the category of "waste management", establish the essence of waste disposal and processing, and determine the main aspects of marketing activities in the context of waste management (Chakraborty *et al.*, 2021).

With the help of the analysis method, the current state of waste management in Ukraine was considered, data was systematized regarding the indicators of volumes of waste generated, waste disposed of, waste incinerated, volumes of waste removed to specially designated places and objects, available waste in places of temporary storage of waste at the end year, volumes of waste accumulated during operation, in specially designated places and facilities. Also, during the study of the state of waste management in Ukraine, a structural method was used to determine the share of specific

waste in the total volume. This method was also used to determine the characteristics of the participation of various types of waste.

When the dynamics of waste volumes were determined, the method of mathematical relative analysis was applied, which helped to establish the peculiarities of changes in the percentage value during the studied period of indicators of the volumes of generated waste, disposed waste, incinerated waste, removed waste to specially designated places and objects, existing waste in places of temporary storage of waste at the end of the year, waste accumulated during operation, in specially designated places and facilities. The integrated method provided an opportunity to substantiate the areas of improvement of waste management measures based on marketing communications. With the help of the integrative approach, the main measures for waste disposal and marketing communications were determined in the context of the optimal model of the national partner system of waste management in Ukraine. And the method of mathematical modeling made it possible to establish the peculiarities of the dependence of the supply of primary energy from the source of biofuel and waste on the generation of waste in Ukraine.

The information base was based on articles and research by experts from Coventry University, Beirut Arab University, University of Mississippi and Polytechnic University of Valencia, University of Oxford. Information from the Ministry of Environmental Protection and Natural Resources of Ukraine (2023), European Commission (2018) was also used to identify the features of waste disposal processes. Data from the State Statistics Service of Ukraine (2023) were used as the basis for the analysis of the state of waste management in Ukraine, which made it possible to consider indicators of various types of waste.

RESULTS

In Ukraine, an imperfect waste management system causes soil, water, and air pollution and harms health, because 94% of waste is not processed, but sent to the landfill. That is why it is important to focus on the expansion of recycling activities in terms of their management (Zaklektka & Mochuk, 2021). Processing of waste is considered to be any technological operations based on changing the physical, chemical or biological properties of waste. The purpose of such actions is to prepare waste for its disposal, removal or environmentally safe storage and transportation. That is, processing can be considered a preliminary stage for carrying out further measures to use waste as secondary energy or material resources, or to burn it to obtain electrical or thermal energy. At the same time, in European countries, the main part of waste is subject to secondary processing (Iardosh *et al.*, 2020).

And in Ukraine, these methods of working with waste are at the stage of study, because there is no established industry for processing and disposal of waste in the country. High-quality processing of waste consists in separate collection, that is, it should take place on the basis of their sorting into types exactly at the place of their origin. In Ukraine, the culture of distributed collection of household waste is almost absent among the population. Only episodic implementation of similar systems is observed, which in turn does not bring any benefit. The sector of waste disposal of electronic equipment is important, because it contains substances dangerous for the environment and humans. Used batteries pose the same threat. But in Ukraine, there is still no enterprise that would be aimed at proper processing of waste.

If pay attention to European countries, they process 20-25% of the total volume of municipal waste through incineration (Zaklektka & Mochuk, 2021). In recent years, plastic recycling has become a very relevant issue in the European Union. Accordingly, there is a long-term strategy for the circular recycling of plastics, which will allow the development of concrete actions that extend to national and regional authorities, cities, the plastics industry and all relevant stakeholders, who must commit to decisive and concrete actions (European Commission, 2018).

An example of a successful waste management system is Japan, where about 65% of the total amount of municipal waste is processed by incineration. At the same time, the share of recycled waste increased to 17%, and buried waste decreased to 18%, which is more than two times less than 25 years ago. Recycling in Japan is based on 73% of waste paper and up to 83% of glassware, but the degree of plastic recycling is only 40%, which can be considered insufficiently equal, because the country has a huge total mass of plastic bottles (Zaklektka & Mochuk, 2021).

The field of waste processing in Ukraine is at the stage of formation and is promising from the point of view of investment. An inadequate waste management system in the country causes the loss of millions of tons of valuable resource materials that are in waste and that could potentially be used in economic circulation every year. Nevertheless, Ukraine is trying to implement decisive steps to improve the waste management system, focusing on European principles in this field. Order of the Cabinet of Ministers of Ukraine No. 820-r (2017) has a number of principles that are oriented towards European standards (Fig. 1). This plan consists in the introduction of economic stimulation measures for the implementation of ecologically clean production technologies and the expansion of the direction of processing with the provision of facilities for the processing of various wastes.

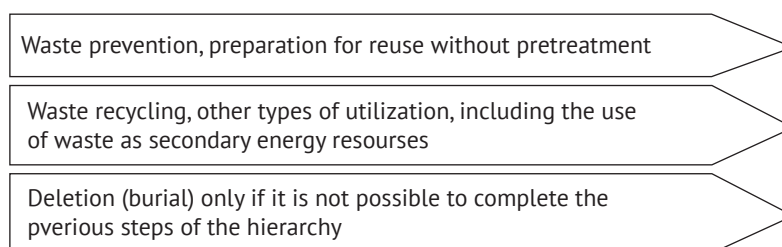


Figure 1. Principles of National Waste Management Strategy in Ukraine until 2030

Source: compiled by the authors

In connection with the adoption of Law of Ukraine No. 2320-IX (2022), Ukraine started implementation of Directive 2008/98/EC of the European Parliament and of the Council (2008), which is the main factor in establishing new European rules of operation in the direction of waste management. Effective implementation of innovations requires the involvement of responsible business. Today, activities are being carried out in 4 main areas to improve the waste management system in Ukraine. That is, the development of sectoral legislation regarding the effective management of waste from the extractive industry, the introduction in Ukraine of the broad responsibility of the producer himself, the establishment of economic means of

stimulating the development of the industry and the increase of the level of administrative responsibility for violations of the adopted rules. The only sure way for the successful functioning of the waste management system is the introduction of waste management reform based on European standards with the use of the latest technologies, which should depend not only on the state, but also on business (Ministry of Environmental Protection and Natural Resources of Ukraine, 2023). In the aspect of researching the waste management system, it is advisable to consider the dynamics of indicators of the volume of generated waste in Ukraine based on the latest data from the country's statistical sources (Table 1).

Table 1. Dynamics of indicators of volumes of generated waste in Ukraine during 2019-2020, thousand tons

Volume of generated waste		2019	2020	Growth rate, %
total		553.0	532.0	-3.8
The amount of waste transferred by producers to the side	total	258.1	243.8	-5.5
	for disposal	212.1	183.0	-13.7
	to remove	27.6	40.7	47.5
	individuals for use	18.4	20.1	9.2
The amount of exported waste		2.2	0.1	-95.5
The amount of imported waste		3.6	1.5	-58.3
The amount of disposed waste		252.1	228.2	-9.5
The amount of incinerated waste		10.6	10.6	0.0
The amount of waste removed to specially designated places and objects		93.3	103.6	11.0
The amount of available waste in temporary waste storage facilities at the end of the year		128.2	128.3	0.1
The amount of waste accumulated during operation in specially designated places and objects		12305.1	12194.8	-0.9

Source: compiled by the authors based on State Statistics Service of Ukraine (2023)

Such trends indicate a low level of development of disposal measures in Ukraine, which is accompanied by the accumulation of large volumes of waste. The statistics shown in Table 1 are presented as of the period before the full-scale invasion of Ukraine, but the dynamics as of 2023 have not changed. That

is, despite the reduction of the population of Ukraine due to hostilities and the large number of refugees who left abroad, the proportion still remains relevant in 2023. Therefore, it is rational to consider the peculiarities of waste generation in Ukraine according to types (Table 2).

Table 2. Dynamics of indicators of volumes of generated waste in Ukraine according to types in 2020, thousand tons

Type of waste	Volume of generated waste	Volume of disposed waste	Volume of disposed waste	Volume of waste removed to specially designated places and objects	Volume of available waste in temporary waste storage places at the end of the year	Volume of waste accumulated during operation in specially designated places and objects
Total	553.0	252.1	10.6	93.3	128.2	12305.1
Waste acids, alkalis or salts	155.7	95.1	4.9	52.7	4.9	2484.9
Used oils	14.2	15.2	2.2	0.0	6.4	0.5
Chemical waste	16.4	3.2	1.1	8.1	35.2	915.8
Sediment of industrial effluents	24.8	8.1	0.0	1.5	17.7	980.6
Medical and biological waste	0.2	0.0	0.1	0.0	0.1	0.1
Waste of ferrous metals	117.1	18.7	–	0.0	41.8	68.8
Waste of non-ferrous metals	4.6	1.9	–	0.0	1.4	0.0
Mixed waste of ferrous and non-ferrous metals	0.7	0.0	0.0	0.0	0.8	0.3
Rubber waste	1.8	0.0	0.0	0.0	1.6	0.1
Wood waste	1.8	0.1	0.2	0.0	1.4	2.7
Waste containing polychlorodiphenyls	0.3	–	0.1	–	0.0	0.1
Waste of plant origin	1.1	0.9	0.1	–	0.0	–
Animal excrement, urine and manure	20.1	13.6	–	–	0.3	–
Household and similar waste	0.1	–	–	–	0.0	0.3
Mixed and undifferentiated materials	73.5	58.5	0.5	8.8	4.9	183.4
Sorting remnants	0.1	–	–	–	0.2	–
Normal sediment	6.3	3.4	–	0.3	0.6	160.9
Other mineral waste	57.0	2.7	0.0	0.6	2.3	6753.6
Combustion waste	16.5	1.5	0.0	9.7	0.7	380.0
Solidified, stabilized or vitrified waste; mineral waste generated after processing	9.9	–	0.3	9.5	0.1	299.1

Source: compiled by the authors based on State Statistics Service of Ukraine (2023)

Accordingly, such a composition of waste in Ukraine in 2020 indicates the need to develop measures aimed at improving the waste management system. In the

course of further research, the structure of the most important types of waste according to the generation in 2020 was considered (Fig. 2).

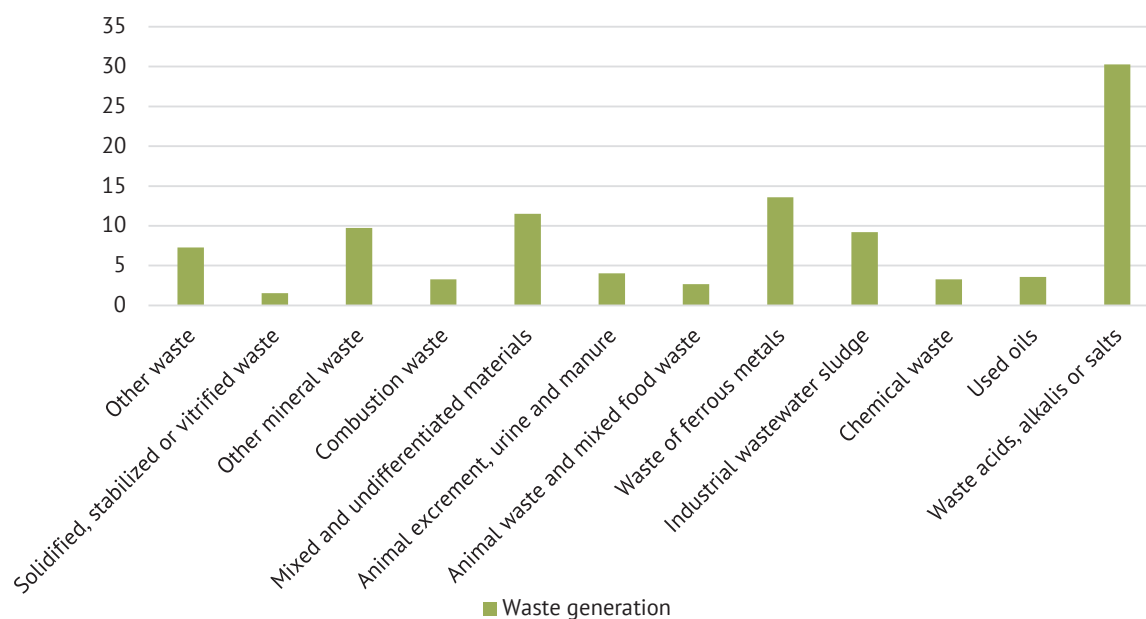


Figure 2. The structure of generated waste in 2020, %

Source: compiled by the authors based on State Statistics Service of Ukraine (2023)

It can be seen from Figure 2 that among the volumes of generated waste in 2020, the highest volumes were waste of acids, alkalis or salts, because their share in the total volume was 30.26%. At the same time, ferrous metal waste in the structure of generated waste accounted for 13.57%, and mixed and undifferentiated materials together with other mineral waste accounted for 11.50%. Also, in the structure of generated waste, other mineral waste occupied 9.74%, and industrial waste sludge – 9.21%. Chemical waste (3.29%), used

oil (3.57%), combustion waste (3.27%), animal excrement, urine and manure (4.04%), waste of animal origin (2.69%) were characterized by somewhat lower shares in the structure of generated waste in 2020. and solidified, stabilized or vitrified waste (1.56%). Other waste in the structure of generated waste occupied 7.29%. In the course of further research, it is advisable to establish the structure of the volumes of waste accumulated during operation in specially designated places and objects (Fig. 3).

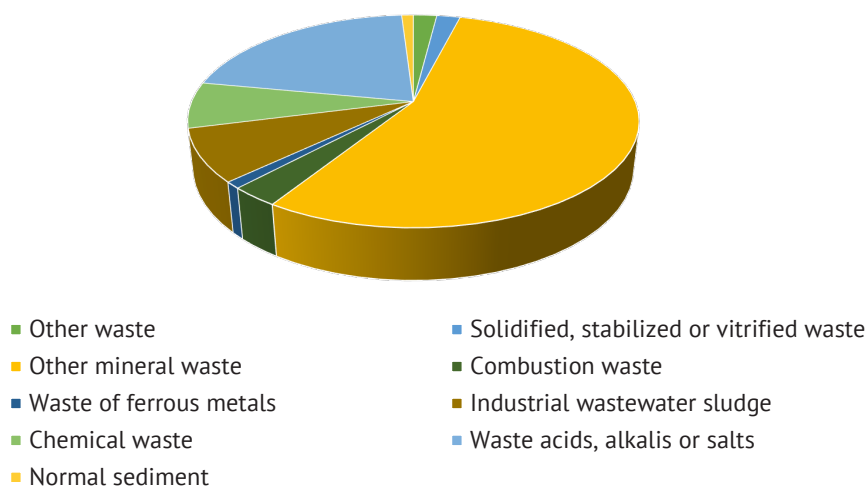


Figure 3. Structure of volumes of waste accumulated during operation in specially designated places and facilities in 2020, %

Source: compiled by the authors based on State Statistics Service of Ukraine (2023)

It can be seen from Figure 3 that in the structure of the volume of waste accumulated during operation, in specially designated places and facilities in 2020,

the highest share was occupied by other mineral waste. Also, the waste of acids, alkalis or salts had a rather heavy specific weight in relation to the volumes of

waste accumulated during operation in specially designated places and objects. At the same time, chemical waste and sediment from industrial effluents each accounted for less than a tenth of the total volume of accumulated waste. By the end of 2020, ferrous metal waste, ordinary sludge, combustion waste, solidified, stabilized or vitrified waste, mineral waste generated after processing and other waste accounted for a relatively small percentage of the accumulated waste in Ukraine.

Thus, the considered trends of the latest dynamics and structure of the features of the waste management

system made it possible to establish that measures for the disposal of the following waste need development and improvement:

- waste of acids, alkalis or salts;
- other mineral waste;
- chemical waste;
- sludge from industrial effluents;
- waste of ferrous metals;
- mixed and undifferentiated materials.

Further, the peculiarities of waste generation by source were considered (Table 3).

Table 3. Dynamics of generated waste in Ukraine by sources for 1995-2020, thousand tons

A total of thousands of tons of waste was generated	1995	2000	2005	2010	2015	2020
	176400.2	184192.4	231189.5	422549.9	312267.6	462373.5
including						
Agriculture, forestry and fisheries	642.2	1251.3	2593.0	8304.5	8736.8	5315.4
Mining and quarrying	-	-	161817.6	347442.3	257861.9	391077.9
Processing industry	-	-	54800.8	47676.5	31000.5	52311.0
Supply of electricity, gas, steam and air conditioning	12817.7	10066.1	8104.7	8636.4	6597.5	5333.7
Construction	54.8	19.1	198.7	326.7	376.2	14.5
Other types of economic activity	28925.4	1025.6	3674.7	3795.8	1641.4	2371.3
Volume of waste collection from households	-	-	-	6367.7	6053.3	5949.7
GDP (gross domestic product) at purchasing power parity (PPP) in constant 2011 prices	260.6	235.9	341.3	358.9	319.8	-
The amount of generated waste from economic activity per unit of GDP at purchasing power parity in constant prices of 2011	676.9	780.8	677.4	1159.6	957.5	-
Volume of waste collection from households per person	-	-	-	138.7	141.4	142.7

Source: compiled by the authors based on State Statistics Service of Ukraine (2023)

During 1995-2020, there is an increase in the amount of generated waste, which is accompanied by an increase in the amount of waste from agriculture, forestry and fishing, the mining industry and the development of quarries. Although at the same time, the volumes of generated waste from construction, processing industry, supply of electricity, gas, steam and air conditioning, other types of economic activity

and from households decreased. Although there is an increase in the volume of waste collection from households per person. According to the identified most significant generated and accumulated waste in Ukraine, it is advisable to propose the following measures for disposal and marketing communications in the aspect of improving the country's waste management system (Table 4).

Table 4. Measures for waste disposal and marketing communications in the context of the optimal model of the national pattern system of waste management in Ukraine

Types of the most significant accumulated and generated waste	Necessary disposal measures	Marketing measures
Acid, alkali or salt waste and chemical waste	Removal of substances in any form, including by special transport; ensuring complete safety during waste collection and transportation; carrying out the correct disposal of waste by means of its preliminary treatment or processing; ensuring neutralization of the negative impact of waste on the environment.	Implementation of measures to stimulate the state of these enterprises. Informational support for waste processing through mass media Creation of social videos about the need for proper disposal of this waste

Table 4, Continued

Types of the most significant accumulated and generated waste	Necessary disposal measures	Marketing measures
Other mineral waste and sludge from industrial effluents	Implementation of comprehensive recycling measures	Establishing relationships between producers and consumers of secondary products
Waste of ferrous metals	Dismantling of structures and collection of metal waste; transportation of waste to a processing enterprise; inspection of metal waste (including dosimetric waste); final waste control; transformation of waste into finished raw products or commercial metal scrap, ready to be used for metal smelting	Informing consumers of services and potential buyers of secondary raw materials regarding the full range of services for the collection, removal and further utilization of metal waste and the availability of the appropriate license
Mixed and undifferentiated materials	The activity is aimed at using the energy potential of waste	Creation of a marketing complex around secondary products. Use of secondary products in energy efficiency

Source: compiled by the authors based on M.C. Xenya et al. (2020), K. Thibuy et al. (2020), Ch. Mbama et al. (2023)

It is important to carry out marketing activities in the direction of developing advertisements for the use of secondary raw materials in energy. This practice of converting waste into energy is quite relevant and effective in Europe and can be an example for Ukraine (Cameron, 2015). In Ukraine, the practice of involving consumers in

the process of manufacturing secondary products is gaining momentum. Or the use of waste for the formation of the interior, means of decoration or improvised things is observed (Zaklekta & Mochuk, 2021). To develop a waste disposal business, it is necessary to carry out marketing communication of the following structure (Fig. 4).

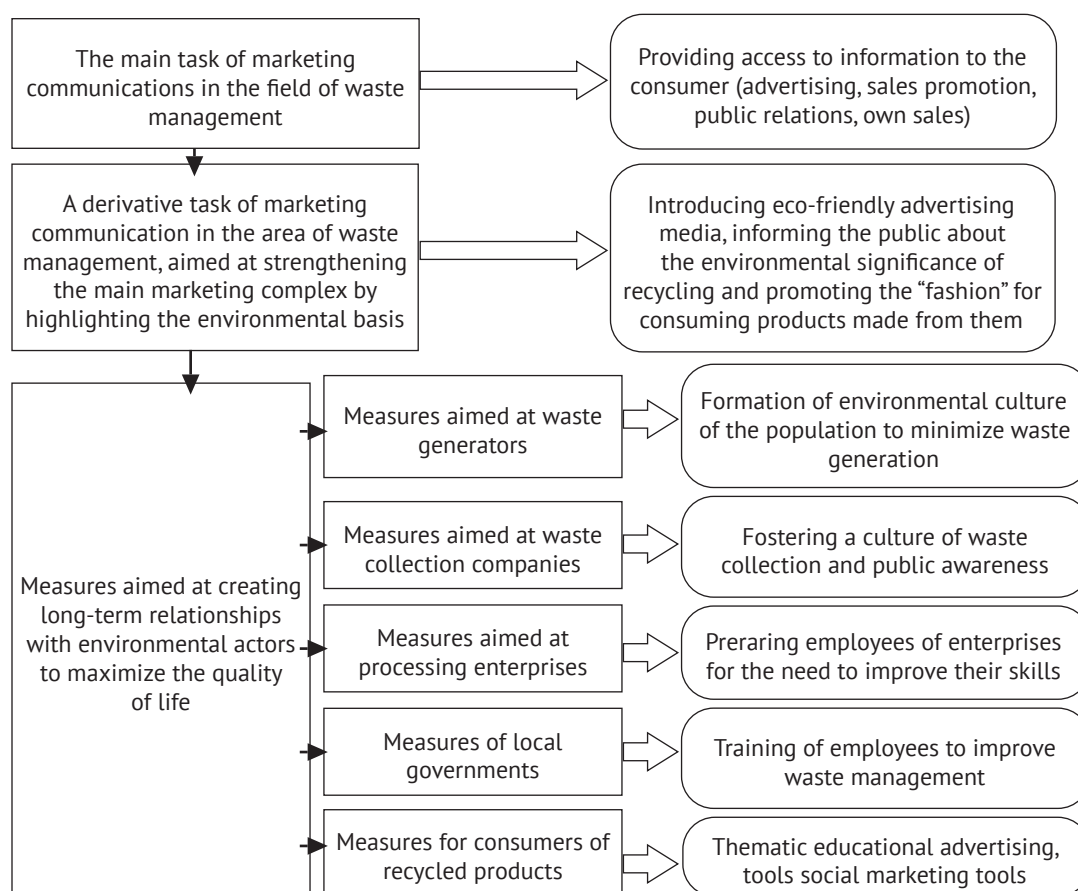


Figure 4. The structure of marketing communications for waste management business in Ukraine

Source: compiled by the authors

The main task of marketing communications in the aspect of running a waste management business in Ukraine should be the implementation of effective measures to inform the country's population about the importance and necessity of this direction. It is important to develop ecological media for advertising, to provide accessible information about the ecological importance of proper waste disposal and introducing the habit of consuming secondary products. In addition, at the stage of waste generation, it is important to carry out marketing communications in the direction of building a culture of citizens and enterprises regarding environmental measures to minimize waste (Jadli & Hain, 2020). At the same time, processing enterprises

are recommended to increase the level of qualification and awareness of employees with the help of marketing communications, and self-government bodies also need to improve the awareness of employees regarding waste management.

It is also important to develop measures for consumers of secondary raw materials using thematic educational advertising and social marketing tools. This structure of marketing communications for running a waste management business in Ukraine will bring recycling to a new level and increase its efficiency. It is expedient to pay considerable attention to indicators of the volume of generated waste of potential secondary raw materials of Ukraine (Table 5).

Table 5. Dynamics of indicators of volumes of generated waste of potential secondary raw materials of Ukraine according to types in 2020, thousand tons

Waste	Volume of waste generated	Volume of waste transferred by manufacturers	Volume of waste disposed	Volume of incinerated waste	Volume of waste removed to specially designated places and objects	Volume of available waste in temporary waste storage places at the end of the year	Volume of waste accumulated during operation in specially designated places and objects
Waste of non-ferrous metals	24.3	25.9	5.4	0.0	0.0	12.2	4.0
Mixed waste of ferrous and non-ferrous metals	10.3	9.8	0.0	0.0	0.0	3.4	1.7
Glass waste	21.0	15.8	7.1	0.0	0.4	113.3	128.3
Paper and cardboard waste	140.8	102.9	0.0	0.3	4.3	8.3	228.2
Plastic waste	40.8	31.2	15.1	0.3	3.2	10.7	110.4
Textile waste	21.9	21.0	0.9	0.1	1.1	1.0	22.2
Unsuitable equipment	5.0	4.2	0.8	0.1	0.2	1.1	1.8
Unsuitable vehicles	1.0	1.0	0.0	–	–	0.7	–
Accumulators and battery waste	4.2	3.6	29.0	–	0.0	4.0	0.0
Animal waste and mixed food waste	405.4	177.9	203.4	4.5	1.9	3.2	45.1

Source: compiled by the authors based on State Statistics Service of Ukraine (2023)

It can be seen from Table 5 that the volumes of generated waste of potential secondary raw materials of Ukraine in accordance with the types in 2020 are mostly transferred to producers on the side, accordingly, the volumes of waste accumulated during operation in specially designated places and objects are insignificant. Non-ferrous metal waste and mixed ferrous and non-ferrous metal waste, unusable equipment and unusable

vehicles have the greatest demand for further production. Waste batteries and batteries, animal waste and mixed food waste are being disposed of quite actively. Compared to other methods of waste management of potential secondary raw materials, incineration is practically not carried out, i.e., a low proportion of waste, which is unsuitable for further processing, is incinerated. At the same time, by the end of 2020, glass waste is stored in

significant quantities for further processing. The volume of waste accumulated during operation in specially designated places and objects is characterized by a significant amount of plastic waste, glass waste, paper and cardboard

waste, and textile waste. Accordingly, it is advisable to single out a number of marketing measures that should be aimed at promoting waste as a potential secondary raw material at the national and local levels (Fig. 5).

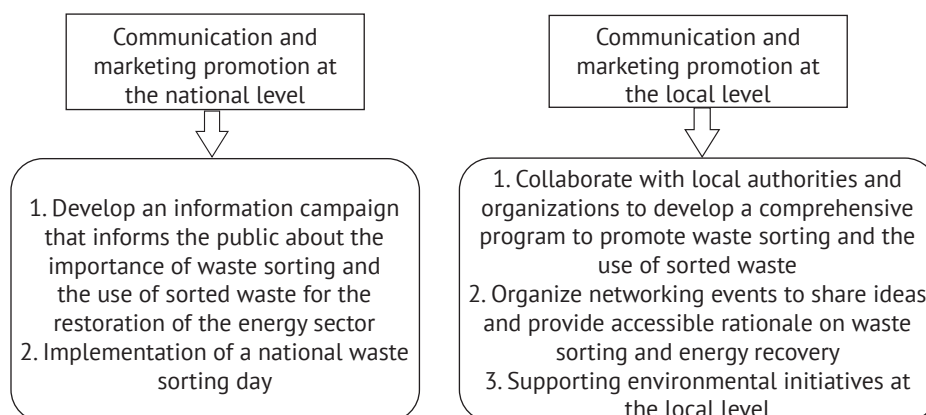


Figure 5. Marketing communications are aimed at promoting waste as a potential secondary raw material at the national and local levels

Source: compiled by the authors

State authorities are recommended, in addition to developing an information campaign that informs the public about the importance of waste sorting and the use of sorted waste to restore the energy complex, it would be advisable to implement, for example, National Waste Sorting Day. It is important to spend this day simultaneously with various activities and contests that will help attract public attention to this topic. At the local level, it is expedient to hold, for example, seminar events, lobbies, presentations and discussions for the exchange of ideas and accessible reasoning about waste sorting and restoration of the

energy complex. At the same time, it is important to have environmental initiatives, that is, to create sorting points, to register in energy complex recovery programs, to promote social projects that promote waste sorting (Khan & Ali, 2021).

Implementation of high-quality waste sorting will help improve the country's energy balance, which is quite relevant at the stage of martial law. If consider the dynamics of the supply of primary energy from the source of biofuel and waste together with the dynamics of the generation of waste itself, the tendency to increase both indicators can be followed (Fig. 6).

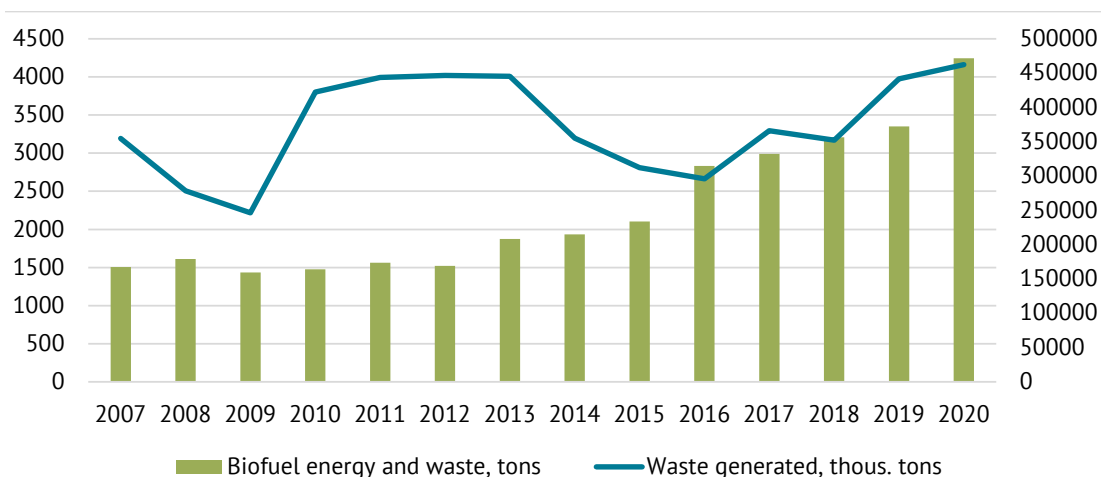


Figure 6. Dynamics of primary energy supply from biofuel and waste sources and waste generation in Ukraine, during 2007-2020

Source: compiled by the authors based on State Statistics Service of Ukraine (2023)

The construction of a one-factor regression helped to consider the dependence of the supply of primary

energy from the source of biofuel and waste on the generation of waste in Ukraine (Table 6).

Table 6. Results of the construction of the dependence of the supply of primary energy from the source of biofuel and waste on the generation of waste in Ukraine

Regression statistics						
Multiple R						0.25
R-square						0.06
Normalized K-square						-0.02
Standard error						904.77
Observations						14.00
Variance analysis						
		df	SS	MS	F	Significance F
Regression		1.00	650709.55	650709.55	0.79	0.39
Remainder		12.00	9823231.67	818602.64	-	-
Total		13.00	10473941.21	-	-	-
	Coefficients	Standard error	t-statistic	P-value	Low 95%	Top 95%
Y-crossover	1094.08	1330.27	0.82	0.43	-1804.32	3992.49
The variable X 1	0.0031	0.00	0.89	0.39	0.00	0.01

Source: compiled by the authors

From Table 6, it can be determined that there is a direct and weak relationship between the supply of primary energy from a biofuel source and waste from waste generation in Ukraine. At the same time, the increase in the amount of waste in the country per unit is accompanied by an increase in the energy of biofuel and waste by 0.0031 tons. That is, there is a connection between waste and the generation of energy from sources of secondary raw materials. Accordingly, an established waste sorting system will help introduce potential waste reduction and increased availability of recycled materials for energy production, as well as improved environmental and public health outcomes.

DISCUSSION

For Ukraine, the issue of marketing communications in the waste management system is quite new and poorly researched, because the waste disposal structure itself is imperfect. An example for the development and implementation of a waste management system is the peculiarities of disposal measures in Europe. After all, for example, when in Ukraine there is only a slight competition among companies in this direction, then in Europe companies are already being created that focus on minimizing the amount of waste.

P. Munten & J. Vanhamme (2023) note that a serious global environmental problem is both the increase in the amount of waste and the demand for its disposal. Such trends contribute to the development of sustainable strategies for waste management. The authors prefer long-term solutions in the aspect of waste management,

that is, they recommend optimizing the average life of consumer goods, rather than resorting to recycling and re-production, in order to prevent the generation of unnecessary waste. It is their repair that can increase the service life of goods, which is a viable long-term solution. Although relative to sustainable waste management, the repair aspect is rarely explored. To reduce the amount of waste, managers are recommended to strengthen and improve their own waste management processes and to encourage the repair of goods. The authors of this article agree with the conclusions obtained as a result of the study of P. Munten & J. Vanhamme (2023) and believe that by combining these two works, it is possible to develop a comprehensive waste management strategy that will take into account current problems and long-term goals of sustainable waste management.

Sh. Vishwakarma *et al.* (2022) conducted research to review the characteristics of e-waste generation and identify the main aspects of its management according to the various challenges and opportunities associated with the sector of sustainable e-waste management. In order to reduce the level of e-waste problems, the researchers developed and implemented a "use case diagram", which consists of interaction between people of different positions and roles with the e-waste management processes themselves. The diagram is built on the interaction between users and the system. The sector of information and computer technologies is one of the main factors influencing the country's economic growth, because its development is accompanied by an increase in GDP, an increase in the number of jobs and an

increase in foreign currency income. At the same time, electronic waste management itself is a significant risk for the technical world. The authors determined that several policies of a corporate nature and stakeholder management strategies have been formed by the relevant industries in order to combat the problems of e-waste. Accordingly, the study recommends that the IT sector develop a well-managed e-waste management system through stakeholder engagement. The authors determined that under the condition of developing a comprehensive strategy for the management of electronic waste, which takes into account technical, economic, ecological and socio-cultural aspects, it is possible to capitalize their transformation into wealth. In summary, the authors add that various initiatives have been launched around the world to address the problem of e-waste (Vishwakarma *et al.*, 2022). Nevertheless, the authors of this article can agree that in recent years, with the development of technologies, the issue of electronic waste management has intensified.

D.J.C. da Silva *et al.* (2022) in their study developed an optimal model of waste management in the field of construction based on the implementation of recycling and subsequent reuse of aggregates. In order to generate empirical evidence, the authors conducted a case study in the south of Brazil. They explained the need for such a model by the fact that with the increase in cities in the world, construction is gaining momentum, and accordingly, the amount of waste is increasing. Accordingly, the study showed that there are a diverse number of alternative options for construction waste through the use of a waste recycling method. The main goal of the developed model is the improvement of the solid waste management system. The authors detailed the roles of each participant in the construction waste management model in accordance with the coordination of municipal bodies. At the same time, the developed model does not take into account territorial features, and, accordingly, can be applied in other regions, companies and industries (da Silva *et al.*, 2022). Researchers see the partnership between various participants as the basis of successful waste processing. According to the authors of the current article, although this model does not consider marketing aspects, it allows building a simplified system for managing large volumes of waste.

M. Tanveer *et al.* (2022) carried out a large-scale study of the peculiarities of waste management in the conditions of a cyclical economy and the development of green technologies. The authors considered 1,118 scientific articles covering the period from 2000 to 2021. The study covered topics related to the specifics of plastic, electronic and construction waste management. Aspects of biological waste management were also determined and the impact of the life cycle on the environment was established. The authors established

that in developed countries the waste management system is established and in general allows them to improve not only the ecological environment, but also their global system in the direction of a sustainable environment. Effective monitoring of human activity in the direction of impact on the environment contributes to such trends. Researchers identified low effective waste management in developing and underdeveloped countries. Thus, the researchers established that the movement towards effective implementation of waste management in an intelligent system is accompanied by an increase in the environmental sustainability of the country (Tanveer *et al.*, 2022). The authors of this study agree that circular economy and green technologies should be present in the chain of waste management in Ukraine, but M. Tanveer *et al.* (2022) do not provide specific recommendations, which makes it difficult to improve this system.

C.-A. Vargas-Terranova *et al.* (2022) conducted research on the optimal design of waste management systems in low-income municipalities. The developed model allows low-income organizations in the aspect of waste management to make calculations based on two scenarios that allow integrating the assessment of socio-cultural dynamics. In addition, the proposed model includes the analysis of other variables that are mostly considered in solid waste management schemes. That is, it takes into account the reduction of the carbon impact based on the transportation of waste to be processed and through the formation of leachates and greenhouse gases, which occurs when the number of associated processors and sampling routes increases (Vargas-Terranova *et al.*, 2022). The authors of this article note that the results obtained using the constructed C.-A. Vargas-Terranova *et al.* (2022) models, which differ from previous results based on the linear economy approach. It is also impossible to assess the optimality of the described model, because the researchers did not take into account the economic aspect.

The waste management system in Ukraine is at the initial stage of development compared to other European countries. Despite this, there has been some progress in the implementation of effective waste management, in particular through the development of sectoral legislation, the establishment of economic incentives and an increase in the level of administrative responsibility. However, there is a need for further development and improvement of measures for disposal of various types of waste, in particular chemical, construction, electronic and other, as well as reduction of accumulated waste during operation.

CONCLUSIONS

Therefore, the analysis of the theoretical aspects of the features of the waste management system in Ukraine

showed that waste disposal is at an initial stage of development compared to other European countries. Today, the development of sectoral legislation regarding the effective management of waste from the mining industry is just beginning. Wide responsibility of the producer himself is being introduced in Ukraine, and economic means of stimulating the development of the industry are being established. At the same time, measures are being implemented to increase the level of administrative responsibility for violations of the adopted rules. The introduction of waste management reform on the basis of European standards with the use of the latest technologies, which should depend not only on the state, but also on business, is considered the only true way for the successful functioning of the waste management system. The waste analysis carried out showed that there is an increase in the amount of waste transferred by producers to the party for removal and use, which is accompanied by a decrease in the amount of waste disposal of this direction of management. At the same time, the amount of waste accumulated during operation in specially designated places and objects is quite large, which indicates a low level of development of disposal measures in Ukraine. The conducted analysis of trends in the latest dynamics and structure of the features of the waste management system allowed us to determine the need for development and improvement of measures for the disposal of acid, alkali or salt waste, other mineral waste, chemical waste, industrial waste sludge, ferrous metal waste and mixed and undifferentiated materials. The waste disposal measures identified in the study will make it possible to organize comprehensive recycling measures, to reproduce the use of the energy potential of waste. At the same time, the proposed marketing measures will help to implement state incentives for recycling enterprises, provide informational support for waste processing through mass media, establish relationships between producers

and consumers of secondary products, create a marketing complex around secondary products and recreate the use of secondary products in energy efficiency. Also, the proposed system of marketing communications for conducting waste management business in Ukraine will provide an opportunity to increase the efficiency of disposal and bring it to a new level with the help of environmental advertising events. It has been established that an established waste sorting system can contribute to the reduction of waste and should be accompanied by an increase in the availability of recycled materials for energy production, which will collectively help improve the country's environment.

The conducted research on the types of waste and secondary raw materials was carried out with the aim of building high-quality marketing communication, on the basis of which measures are planned for a positive impact on society. Further research should be based on the development of new methods of evaluating the efficiency of waste disposal based on their use as energy products of the zones and should be focused on the introduction of measures to evaluate the effectiveness of the proposed marketing measures aimed at attracting investors to the waste disposal business.

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CONFLICT OF INTEREST

None.

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Маркетингова комунікація в контексті оптимальної моделі національного патерну системи управління відходами в Україні

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Анотація. Питання стосовно раціонального управління відходами в Україні стоїть доволі гостро. Система знаходиться у стані занепаду, адже близько 94 % відходів потрапляють на сміттєзвалища та тим самим негативно впливають на навколишнє середовище. Саме тому питання побудови досконалої системи управління та застосування при цьому маркетингових комунікацій в Україні є досить актуальним, адже належне управління відходами за допомогою маркетингових заходів дозволить не тільки зберегти навколишнє середовище, а й залучити вторинну сировину в енергетичне чи подальше виробництво. Метою даної роботи було дослідження та узагальнення аспектів маркетингових комунікацій в контексті оптимальної моделі національного патерну системи управління відходами в Україні. У дослідженні були використані системний метод, метод аналізу та комплексний й інтегративний методи. Було визначено, що рівень обсягів утворених та накопичених відходів в Україні є досить високим. Встановлено, що необхідно розвивати та удосконалювати заходи з утилізації саме відходів кислот, лугів чи солей, інших мінеральних та хімічних відходів, осадів промислових стоків, відходів чорних металів та змішаних та недиференційованих матеріалів. Визначено необхідні заходи з утилізації відходів, які у свою чергу мають надати можливість організувати проведення комплексних заходів з переробки відходів та забезпечать використання їх енергетичного потенціалу. Встановлені у дослідженні маркетингові комунікації допоможуть здійснити впровадження заходів зі стимулювання з боку держави підприємств з утилізації, провести налагодження взаємозв'язків між виробниками та споживачами вторинної продукції, надати інформаційну підтримку переробки відходів через ЗМІ, здійснити створення маркетингового комплексу навколо вторинної продукції та відтворити використання вторинної продукції в енергоефективності. Рекомендована структура маркетингових комунікацій для ведення бізнесу з управління відходами в Україні дозволить вивести на новий рівень утилізацію та підвищити її ефективність. Практична значимість дослідження полягає в тому, що визначені заходи з утилізації відходів та супровідних маркетингових комунікацій можуть бути використані в Україні з метою підвищення результативності системи управління відходами

Ключові слова: маркетингова комунікація; управління відходами; реклама; тренди; трансформація суспільних цінностей