ECO-MANAGEMENT OF ORGANIZATIONS WITHIN THE GREEN ECONOMY SYSTEM

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Abstract
The article examines the significance and role of eco-management in the system of green economy as it is connected with the need to develop new scientific and methodological approaches to managerial decision-making aimed at ensuring resource-oriented production and economic activities of an organization. The purpose of the research is to develop management technologies for eco-management to build a green economy. The eco-management technologies are studied in the following areas: 1) an analysis and evaluation of statistical observations on economic development trends and identification of issues in resource conservation, 2) justification of the need for a new approach to managing organizations, namely considering an environmental component in the decision-making process, 3) the choice of resource-saving measures in terms of a limited financial budget, 4) algorithmic implementation of environmental management components as an important component of an organization's competitive strategy.
The methodical approach to the choice of environmental measures and criteria of resource utilization completeness is suggested. This allows forming the information space as a basis for making management decisions in the field of ecological safety of industrial organizations. During the last decade, the main trends of economic development have confirmed the importance of resource efficiency as far as economic and environmental aspects, which has allowed to determine the impact of research results on the economy and the environment from the standpoint of sustainable development. To this end, practical recommendations for reusing industrial waste in the production activities of companies have been provided. Within the established system of principles, criteria, and factors of rational and efficient use of resources in the conditions of modern economy, the issues of identifying and revealing the features in the development of branch organizations within the mechanism of their resource efficiency have proved to be crucial and of paramount importance.

Keywords
green economy, environmental management, sustainable development, efficiency, resource conservation, environmental responsibility

Introduction

Researchers of possible development strategies for the green economy [1,2] point out that developing a proper strategy is one of the important tools for ensuring the sustainable development of any country. Fatoki has explored the impact of green entrepreneurial orientation (GEO) on sustainable performance (SP) in the context of the hospitality sector [2]. When explaining the role of the green economy in sustainable development, as exemplified by EU member states, researchers [3] conclude that the analysis of different green concepts has historically been linked to a broader discussion of the relationship between sustainable development and the environment. The researchers point out that the issues of resource conservation and resource efficiency under the green economy paradigm are promising and extremely important [4].

The analytical data and statistical observations show that the resource potential is in short supply. According to 2017, in terms of green economy, the world leaders are Sweden (1st place), Switzerland (2nd place), Iceland (3rd place), Norway (4th place), and Finland (5th place). The maximum growth of the green economy index for the period 2015 to 2017 was observed in countries such as China (+15.2), Switzerland (+12.8), and Canada (+10.1) [*5*]. The development of a wide range of environmentally friendly technologies is expected in the near future (Table 1).

Table 1. Prospects for the world development of the Green Technology Market in 2016-2025. *Source: [5]*

No	Green Technology Market Segments	2016	2025		Average annual growth rate, 2016 to 2025
		bln euros	bln euros	2025 to 2016	
1	Eco-friendly production, energy storage and distribution (storages, smart grid, etc.)	667	1,164	1.75	6.4
2	Energy efficiency sub-market	837	1,491	1.8	6.6
3	Efficient use of raw materials (including the production of biological substitutes for fossil raw materials)	521	1,048	2.0	8.1
4.	Environmentally-friendly mobility (development of new transport technologies and production of biofuels)	412	988	2.4	10.2
5	Circular economy (waste management)	110	210	1.9	7.4
6	Environmentally sustainable water management (including various aspects of waste management)	667	1,001	1.5	4.6
	Total	3,214	5,902	1.8	6.9

The components of the green technology market cover specific segments and aim at reducing the negative impact on the environment by cutting down the amount of consumed resources, reducing the amount of waste with a goal of full cyclical return of waste to production through deep processing, introducing mechanisms and principles to the production process that display their effectiveness in nature., enhancing the energy efficiency of production and everyday life and improving the properties of materials in terms of environmental safety.

Since 2018, the Global Green Economy Index (GGEI) has been measuring green economy indicators in 130 countries. The paths to green economic growth vary greatly between countries. In terms of the green economy index, the world's leading countries did not change in 2018, but new countries emerged as far as their ranking, such as Ukraine (121st place), Moldova (120th place), and Serbia (115th place). In recent years, fast growing countries have tended to put an increased focus on environmental technologies [6].

The implementation of green technologies is conjugated with expenditures. Environmental expenditures in European countries are accounted in accordance with the SERA-2000 classifier based on the data obtained from enterprises and organizations engaged in environmental protection activities in various sectors of the economy, from households, authorities, and government agencies. In 2018, EU member states spent € 297 billion on environmental protection that made up 1.9% of the gross domestic product [7]. The highest growth rate of expenditures on environmental protection activities of EU member states (Fig. 1) was observed in 2017 when such expenditures accounted for € 289 billion representing 1.955% of the gross domestic product [7].

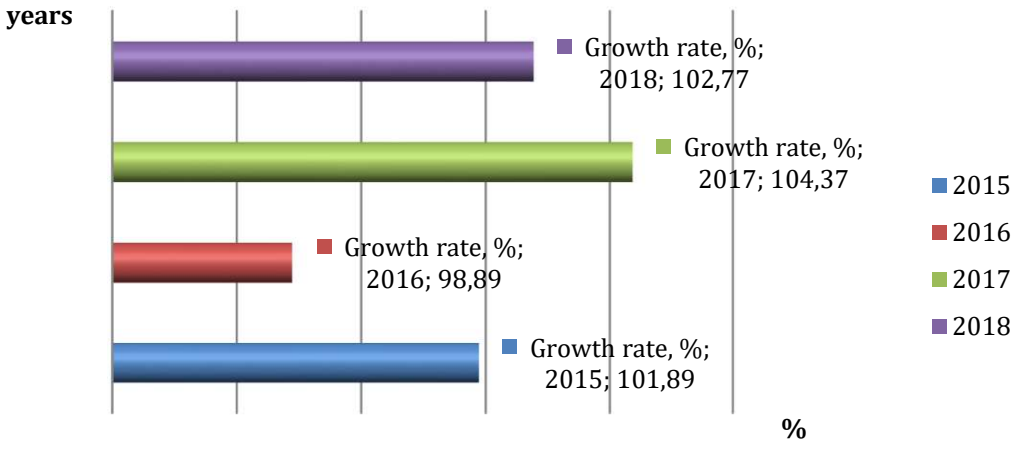


Fig. 1. Comparative dynamics for environmental expenditures. *Source: [7]*

EU countries have endorsed a joint program for transition to a low carbon economy by 2050. The program sets out the objectives for reducing carbon dioxide emissions by sectors, by both 2030 and 2050 (40-44% and 79-82%, respectively). A number of the measures required to achieve these, and other long-term goals are listed. Such measures include cutting fuel costs (by € 175-320 bln per year) and reducing dependence on energy exports. To increase energy efficiency of the EU economy by 20% by 2020, the following objectives have been determined: to reduce the fixed emission limit within which allowances are allocated and to give access to the market of allowances for sectors that have not previously participated in the tender. The need for these changes is due to the impact of the economic crisis, the fall in the carbon price without a real increase in energy efficiency [7]. For comparison, the growth rate of environmental spending in Ukraine comprised 111.87% in 2015, 132.65% in 2016, 96.92% in 2017 and 106.03% in 2018. That is, in recent years there has been a decrease in the total value of environmental expenditures [8].

When assessing the environmental security of differentiated territories, the experts [9] suggest applying a methodological approach to a comprehensive statistical study of the environmental security of differentiated territories. The approach is based on a method of comprehensive assessment of the environmental security level as a result of the mutual influence of industrial, agricultural, and environmental activities on environmental innovations.

According to the research results [10,11], the scientists formulated the conditions required for establishing a green economy: the adoption and dissemination of sustainable development ideas at different levels of the economic system, the formation of models for economic development with priority to environmental needs, the unification of society on the basis of environmental and humanistic values, and the formation of the rule of law and civil society with the ability to protect human rights and preserve the biosphere. The transition to sustainable development should take place on company, regional, national, and international levels. It is important to combine the interests of an organization with the policy and goals set at a higher level. The researchers [12] presented the current practices and behaviour of companies towards environmental management in the selected industrial sector in the Czech Republic. The authors identified three levels of the environmental management system — legal, basic and mature.

In the face of the global environmental crisis the scientific community emphasizes - there is an urgent need to apply a fundamentally new approach to managing organizations, namely, to consider the environmental factor when making a decision. From this point of view, the most progressive organization management schemes are offered by the European Commission (Environmental Management and Audit Scheme, EMAS) and the International Organization for Standardization (ISO 14001: 2004) [13]. They regulate requirements for the environmental management system (EMS) designed to effectively manage the environmental aspects of company's operations, products and services.

In environmental management, the economic entity operates in human-nature relationships. The closest contact between economic entities with an environmental management system arises when implementing regional policies and programs. Regional resource conservation policy sets common priorities and value orientation for sustainable development of the region [14]. The need for mutual harmonization of requirements in the field of resource conservation with an organization's capabilities causes the establishment of new functional relationships with the systems of environmental management of organizations. According to research that includes World Bank statistics, one-third of all products in the world will eventually not be consumed and go to waste. Unlike in EU member states, in Ukraine, industrial waste increases annually by 14%, which is higher than the consumption rate. More than 40% of all household waste is represented by packaging. As for the industrial enterprises, the production industries are leading in the amount of waste (30 to 95% of their raw materials are not utilized). However, the landfill remains the most common site for disposal of industrial waste materials in Ukraine [15].

To compete successfully in the global market, organizations need to follow green standards including the use of secondary material resources. Reasonable secondary material resources management convincingly proves ecological and economic efficiency. Thus, Greece has introduced waste lubricant oil (WLO) management systems and pushed a number of Greek factories into cutting off the import of raw materials as the amount of WLO is sufficient to meet production needs [16]. Italy and Spain have implemented wastewater treatment projects

for textile and leather factories for further use of the wastewater in agricultural and other businesses. These technologies have reduced the overall consumption of water factories by 40%, as well as the load on water resources for industry; they are also able to increase the availability of drinking water in some areas [17].

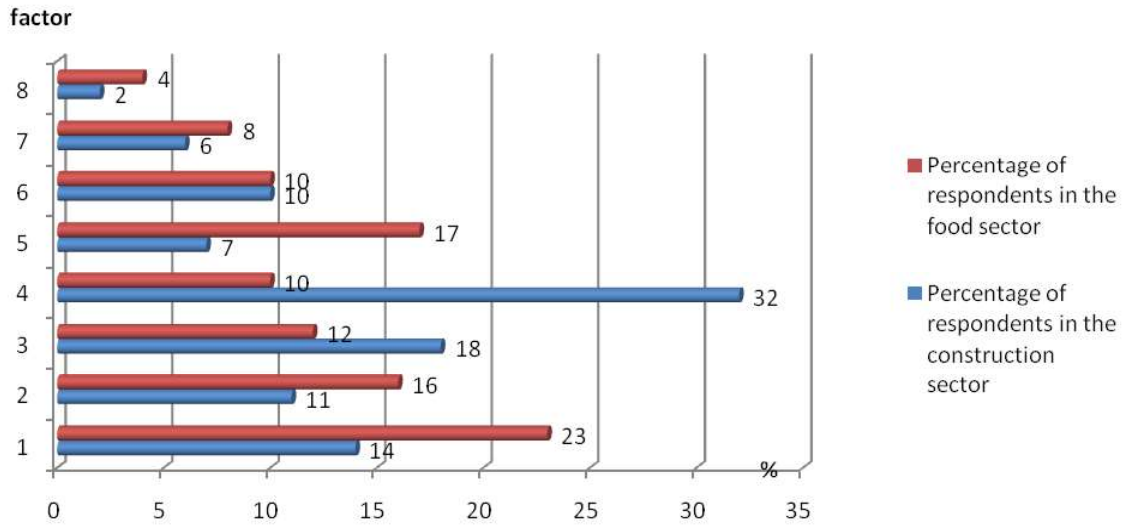
Methods

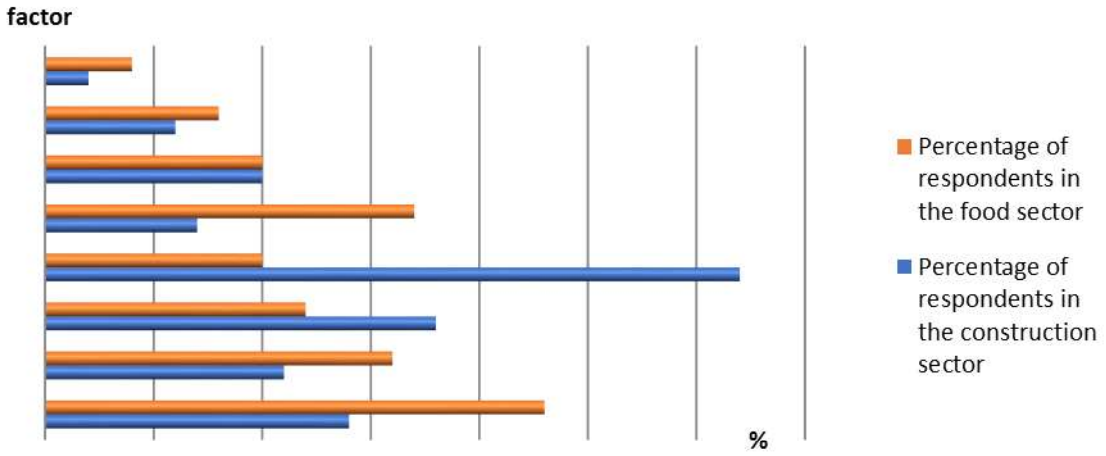
The authors used benchmarking techniques to assess the dynamics of environmental costs for organizations in EU member states and the prospects for the development of the green technology market in the world for 2015-2018. This allowed confirming the relevance of the study and identifying barriers to the green economy development. Using the expert method and questionnaire, the authors have identified the prerequisites for implementing environmental management in Ukrainian industrial companies. The survey was conducted for 40 large and medium-sized industrial companies (50% of firms from the construction sector and 50% of enterprises from the food sector) covering the period from September 2019 to January 2020. The authors controlled such variables as resource consumption by a company (in total MI numbers), number of resource-saving measures, financial resources spent on the event, and the total amount of the environmental budget.

The authors find that the algorithm for selecting resource-saving measures within the organization's environmental management with a limited budget will maximize its impact. An empirical study was based on a set of data on industrial enterprises for the period from September 2019 to January 2020. An expert survey procedure was chosen to implement the algorithm for selecting resource-saving measures of the organization. For this purpose, two expert groups were formed, each of which included enterprise specialists and research staff. Each group was composed of 15 persons. Furthermore, the companies were ranked by level of waste using the waste coefficient as a criterion of completeness.

Results and discussion

Environmental responsibility of business plays an important role in shaping and maintaining the reputation of organizations. To determine the most important prerequisites for implementing environmental management in companies, the researchers surveyed 40 large and medium-sized industrial companies (50% of firms from the construction sector and 50% of organizations from the food sector). The survey was conducted among top and middle level managers. The empirical data obtained during the study indicate that the need for environmental management in companies is driven by the effect produced by such factors (Fig. 2).





Factors: 1. Formation of legal and organizational conditions for rational use of nature. 2. The environmental degradation. 3. Creation of scientific and technical potential for transforming to an economy based on nature conservation. 4. Growth of production capacities with respect to the needs of new technologies. 5. Exacerbation of the environmental impact of companies. 6. Change in the orientation of social production. 7. Minimization of production waste. 8. Arrangement of the production accounting system to reflect the value of natural resources.

Fig. 2. Main prerequisites for implementing environmental management in industrial companies. *Source: Author's*

The Environmental Management System (EMS) is a subsystem of an organization's management system, which operates on the basis of ISO series of standards. International standard ISO 14001: 2004 is based on the Plan-Act-Analyze-Improve methodology. According to the international standard ISO 14001: 2004, an organization must identify the environmental aspects they can control and influence. The head of the organization is responsible for the EMS boundaries within the overall organization management. The boundary can be outlined by the main types of business activities, products and production sites. This choice is based on the following criteria: materiality of environmental aspects; possible application of requirements stated in ISO 14001: 2004; and stakeholder requirements.

The objects of the EMS in the company are represented by products and services; functions (processes) and activities related to these products and services; equipment and various systems (water and power supply, treatment plants, ventilation, etc.); units related to these products, services and equipment. Implementation of environmental management components as an important element of an organization's competitive strategy includes the following main elements such as:

- assessment of the current management system for identifying reserves to increase the competitive advantage of the organization through environmental management
- assessment of the feasibility of implementing an EMS at a particular company in the given period of its life cycle
- introduction of environmental management elements as factors used to create competitive advantage of the organization
- monitoring of competitive advantages created by the environmental management system

One of the EMS strategies is the development and implementation of production tasks in the direction of resource supply with minimal negative impact on the environment. B. and D. Lewicka explore the components of environmental management systems (EMS) and note their strong impact not only on the environment but also on the company image and its financial results [18].

Resource management tools comprise budgeting; formation and adjustment of the regulatory framework (by price, by components of the main types of resources); control of resource supply processes; stimulation of resource saving production by all participants at every stage of the manufacturing process. The implementation of resource-saving measures is complicated by the scarcity of financial resources. Therefore,

it is necessary to select measures which will allow achieving maximum effect in terms of a limited budget. This requires relevant information. The authors [19, 20] classify information sources and emphasize the use of reliable data in making management decisions at the enterprise level. The authors suggest selecting resource-saving measures based on two parameters such as maximizing resource savings and minimizing financial costs. Resource maximization is estimated in total MI numbers, whereas minimization of financial expenses is expressed in terms of monetary units. The solution method is integer linear programming: 1 (the measure is to be implemented), 0 (the measure is not to be implemented). When solving the problem, it is assumed that the jth measure corresponds to δ_j(j = 1, ..., n). Mathematical description of the problem of choosing a priority measure in solving the resource conservation issue is as follows [21]:

$$\max L = \sum_{j=1}^{n} c_j \delta_j \tag{1}$$

$$\begin{cases} \sum_{j=1}^{n} a_{ij} \delta_j \le b_i (i = 1,\ldots,n), \\ \sum_{j=1}^{n} \delta_j \le n \end{cases} \tag{2}$$

Where L — total reduction in the organization's resource consumption (in MI aggregate numbers); c_j — reduction in the organization's resource consumption (in MI aggregate numbers) in undertaking the δ_j measure; n — number of resource-saving activities; a_{ij} — financial resources spent on undertaking the δ_j measure; b_i — total amount of the environmental budget.

The algorithm for choosing resource-saving measures with a limited financial budget is presented in Fig. 3, where Ej — effectiveness of the measure undertaken.

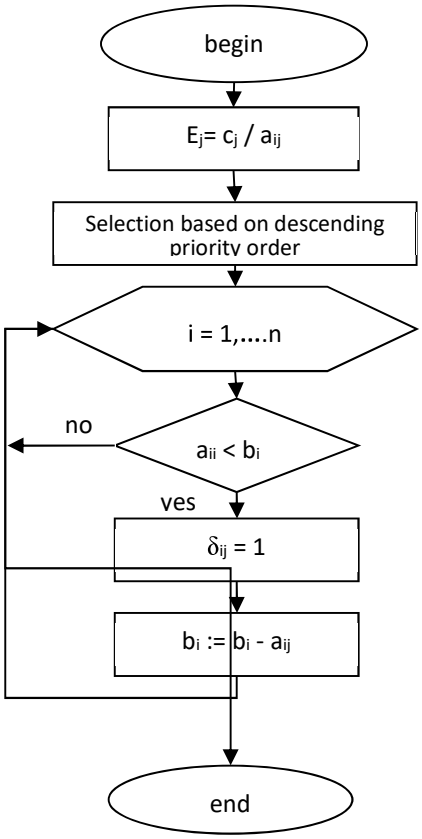


Fig. 3. An algorithm for selecting resource-saving measures within the environmental management of the organization. *Source: Author's*

Thus, solving the problem of integer programming with Boolean variables allows identifying the most significant environmental measures considering the availability of limited financial resources of the company.

To implement the algorithm for selecting resource-saving measures within the environmental management of the organization, an expert survey procedure is chosen. The expert survey procedure includes organizational, methodological and analytical steps. At the organizational stage, a working group is formed. Expert competence is assessed through questioning, analysing the level of referencing (the number of references to the specialist's work) and using self-assessment sheets. The degree of suitability of a particular expert for the questionnaire is determined by the competence coefficient:

$$K_a = \Sigma V_{ij} / \Sigma V_j \quad (3)$$

Where K_a – reliability factor of the questionnaires; V_{ij} – weight of the j^{th} gradation (emphasized by the expert who is being evaluated) and the i^{th} characteristic (in points); V_j – the maximum weight of the j^{th} characteristic (in points).
In the process of self-assessment, each expert determines his/her education level using a ten-point grading scale which contains indicators characterizing the degree of the expert's participation in the development of the issue under study. Based on the self-assessment, the expert's competence is calculated:

$$Kc = \Sigma k / \Sigma n \quad (4)$$

Where Kc – the expert's self-esteem competence factor; k – self-assessment (in points) which characterizes the degree of expert's awareness of the k^{th} problem; n – the highest possible self-esteem (10 points).

As a result, two expert groups were formed, taking into account the sphere of business activities. This group included enterprise professionals and researchers. Each group was composed of 15 persons.
At the methodical stage, a problem was formulated, questionnaires were developed, survey period and schedules were set. The degree of concordance of experts' opinions was assessed using the coefficient of concordance. K_{con} (expert group 1) – 0.905, K_{con} (expert group 2) – 0.852. The statistical significance of the coefficient of concordance was verified by the Person criterion. At the analytical stage, priority directions were outlined to solve the problems of resource conservation for industrial enterprises (large and medium-sized) of the food and construction industries. These directions were clustered as follows: 1) technological; 2) environmental; 3) marketing; 4) organizational (Tables 2-5).

Table 2. Ranking results for technological measures. *Source: Author's*

No	Measure	Company ranking by industry			
		industrial construction companies		food engineering companies	
		large	medium-sized	large	medium-sized
1	Application of low-waste and non-waste technologies	6.25	5.12	6.12	7.00
2	Repair and replacement of obsolete equipment	2.1	2.2	3.01	4.14
3	Increasing the mechanization and automation level of production	3.05	3.01	5.1	3.02
4	Development of project documentation for the use of advanced technologies	4.2	4.41	2.09	1.4
5	Quality control of raw materials	6.98	6.79	7.00	6.14
6	Arrangement of waste collection, sorting and utilization	5.11	6.08	4.1	5.02
7	Other	1.1	1.12	1.58	2.34

Technological measures are aimed at reducing waste and loss of materials. The activities of this group take place at the stage of production. An expert analysis has revealed that the experts select the use of low-waste and waste-free technologies and quality control of raw materials taking into account the peculiarities of activities, duration of the production cycle, and the most significant technological measures in the direction of resource conservation. The processes of arranging the collection, sorting and use of waste and developing project documentation for the use of advanced technologies are quite significant.

Table 3. Ranking results for ecological measures. *Source: Author's*

No	Measure	Company ranking by industry			
		industrial construction companies		food engineering companies	
		large	medium-sized	large	medium-sized
1	Assessment of the harmful effects of the organization's production on the environment	3.41	3.03	3.04	3.12
2	Reflection on the interconnection of the main production and environmental activities of an enterprise in the policy	2.14	4.01	4.32	4.012
3	Use of eco-labels	5.00	4.958	5.00	4.587
4	Preparation of proactive environmental reporting (green reporting)	4.14	1.04	2.3	1.02
5	other	1.03	2.21	1.05	2.4

Environmental measures are aimed at maintaining environmental security to ensure sustainable development. An expert analysis has revealed that the most significant environmental measures of organizations in the construction industry are using environmental labelling, reflecting the interconnection of the main production and environmental activities of organizations (for medium-sized businesses) in the policy and preparing proactive environmental reports (for large organizations). The most significant environmental measures of food industry organizations are using eco-labels and reflecting the interconnection of the main production and environmental activities in the company's policy.

Table 4. Ranking results for marketing measures. *Source: Author's*

No	Measure	Company ranking by industry			
		industrial construction companies		food engineering companies	
		large	medium-sized	large	medium-sized
1	Identifying the most profitable suppliers in terms of their geographical location	1.02	1.01	5.45	4.13
2	Choosing the best vehicles for deliveries	3.2	2.13	3.00	3.12
3	Constantly specifying contract work details and revising the list of suppliers considering their stable position in the market and reliability in fulfilling their obligations	6.00	6.00	2.05	2.14
4	Expanding methods of interaction with customers based on their accurate fulfilment of the agreed delivery conditions regarding assortment, amount, terms and address.	5.01	5.00	5.897	5.98
5	Developing the most rational schemes and routes for cargo transportation	4.23	4.27	4.17	5.03
6	Other	2.1	3.12	1.02	1.1

Marketing activities are aimed at finding and attracting reliable partners. An expert analysis has revealed that the most significant environmental measures taken by organizations of the construction industry are as follows: constantly refining contract work details and revising the list of suppliers considering their stable position in the market, reliability in fulfilling obligations and expanding methods of interaction with customers on the basis of the most accurate and agree terms of delivery. For food industry organizations, it is the development of the most rational schemes and routes of cargo transportation and expansion of methods to interact with customers.

Table 5. Results of organizational measures ranking. *Source: Author's*

No	Measure	Company ranking by industry			
		industrial construction companies		food engineering companies	
		large	medium-sized	large	medium-sized
1	Optimizing the organizational structure of resource management and distributing responsibilities	1.01	1.05	2.02	1.01
2	Developing normative-technical and organizational-methodological base (standards)	5.98	5.00	6.89	7.00
3	Operational control over the targeted use of human resources	4.01	4.02	3.00	3.04
4	Operational control over the targeted use of logistical resources	5.01	6.03	4.03	6.125
5	Production planning, including the development of network schedules, calendar plans, work schedules, resource schedules;	7.00	6.98	5.985	4.789
6	Staff training, internships and advanced training	3.06	3.21	5.02	5.04
7	Other	2.2	2.3	1.01	2.2

Organizational activities are aimed at improving the production organization and planning with a view towards the rational use of resources. They are to develop a comprehensive resource management system for the company. According to the experts, the most significant environmental measures of industrial construction companies are as follows: production planning, development of regulatory, technical and organizational, and methodological base (standards), operational control over the targeted use of material and technical resources. The following measures are defined for food industry organizations: development of normative-technical and organizational-methodological base, production planning, and personnel training.

Consistent implementation of the studied measures provides an opportunity to evaluate the effectiveness for the organization as a whole. For this purpose, it is advisable to use a system of targets, including the rate of resource consumption reductions, the rate of harmful emission reductions, the rate of material resource utilization, the rate of production volume growth and the product range expansion based on cost savings.

When developing a resource conservation policy, an organization should identify the key factors that affect the effectiveness of the methods used and the degree to which the targets are met within the organization's resource-oriented activities. To this end, on-going and strategic analyses of the activities should be carried out. A factor that has a direct impact on the efficiency of an organization's resource conservation is industrial waste processing and recycling. In EU countries, considerable attention is paid to the promotion of products made using recycled materials. In terms of profitability, such production may be inferior to environmental value. Considering the complexity of the connection between the functional elements of the eco-economic system and the material and raw-material flows, the place of waste in the reproduction system has been determined (Fig. 4). This made it possible to justify possible directions of industrial waste utilization in the organization and to evaluate their impact on the results of economic activity.

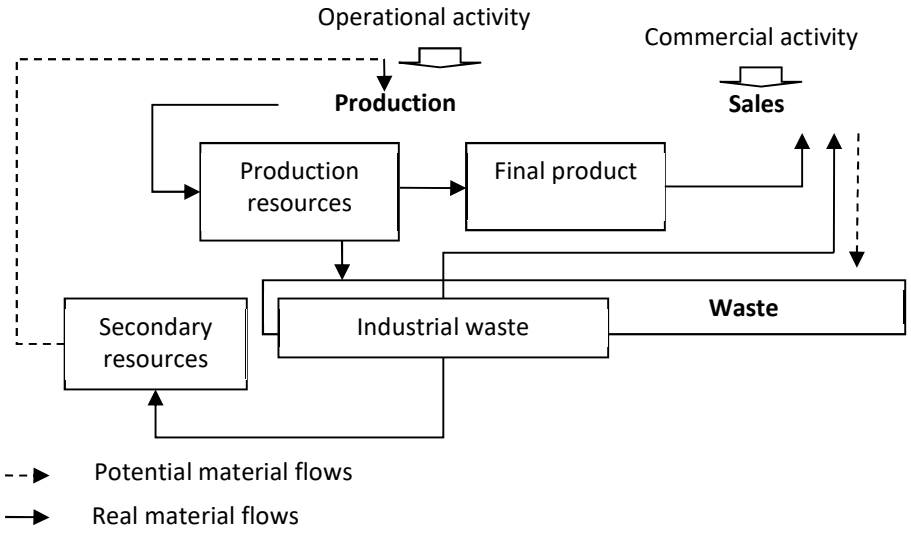


Fig. 4. Waste positioning in the organization's reproduction system. *Source: Author's*

The key elements of a waste management strategy are the prevention of waste accumulation or its minimization. Reuse, disposal or demolition of wastes is only intended to be used in cases in which there are no other alternatives available. Thus, the use and implementation of methods for preventing industrial waste accumulation is a paramount principle of the waste management strategy in the environmental management system.

The criterion of completeness for resource use is the coefficient of non-waste:

$$K_{nw} = f \cdot Km \cdot Ke \cdot Ka \quad (5)$$

Where f — empirical coefficient of proportionality; Km — coefficient of material resource use; Ke — coefficient of completeness of energy resource use; Ka — coefficient of conformity of production to energy requirements.

Grouping of surveyed organizations by the waste rate is represented in Table 6.

Table 6. Company ranking by the level of profitability. *Source: Author's*

groups	Km value	Group Name	Number of companies surveyed by industry and size,%			
			industrial construction companies		food engineering companies	
			large	medium-sized	large	medium-sized
I	Km ≤ 0-0,51	waste	22	18	18	29
II	Km ≤ 0,81 - 0,9	low-waste	64	71	73	64
III	Km > 0,9	waste-free	14	11	9	7

The implementation of EMS in the organization improves its management, sustainability (through improving the quality of manufactured products; increasing the competitiveness level; reducing costs associated with the environmental impact of the organization; and increasing investment) and mobility (through improving production efficiency and products being recognized at the international level and in the world market). These benefits can be attributed to the systemic advantages obtained as a result of EMS implementation.

We agree with the research results provided by Chorna, Filipishyna et al, regarding the importance of analytical support for the management of economic and environmental security of organizations [22]. The effectiveness of managing the environmental and economic security of an organization depends on the starting

points of the ecological and economic analysis. At the same time, the results of such analysis are important in the field of environmental management for the quality of management and alternative directions of the resource conservation strategy. Anishchenko et al., [23] present the results of an environmental safety analysis of a company through waste management. The criteria that can be used to recognize waste as an economic resource are identified. These criteria are the basis for a new understanding of such an economic concept and the basis for shaping the behaviour of economic agents in waste management. We believe that the criteria they offer have a significant impact on the formation of a waste accounting system and waste management operations. Novikovas and Stankevičius define the elements of environmental safety, namely, waste management, which is characterized as a complex phenomenon that includes administrative, functional, political, and technological aspects, along with the aspects of infrastructure [24].

The research has also been conducted towards extending the results of Kochańska, Adamkiewicz, and Bertozo, who analyze the possibility of using fish waste to increase the profitability of fish processing enterprises [25].

Bombiak [26] notes that the modern concept of business management includes conscious activity focused not only on financial profit and economic aspects but also on social and environmental interests. At the same time, the author [26] emphasizes, and we agree, that eco-oriented management is carried out exclusively by employees with a positive attitude towards the environment, environmentally friendly competences and who take responsibility for the environmental consequences of their actions. Thus, the environmental management system of the company becomes effective in compliance with the principles of environmental corporate responsibility and environmental awareness of employees and managers, which are the keys to the sustainable development of the organization.

The study of the theoretical aspects and practical recommendations of these authors suggests that they have deepened the theoretical foundations and practical tools of environmental management in organizational management systems. However, it requires innovative approaches to analytically ensure the environmental management of the organization based on compliance with the objectives of the quality management level and alternative areas of the resource conservation strategy which determined the choice of research topic.
Working in line with researches of these scientists, the authors have expanded the use of eco-management tools and found that the algorithm for selecting resource-saving measures within the organization's environmental management with a limited budget will maximize its impact.

Impact
Ensuring company development in a green economy can be improved by implementing EMS in the company. Eco management provides the organization with:

- increased level of management culture and proper activities
- ecological quality of products (services) in the green economy system
- increased competitiveness of products by taking into account the environmental component
- sustainable and enhanced company reputation towards ensuring environmental responsibility of the business
- sustainable development of the organization.

Application of the proposed algorithm for selecting resource-saving measures in the framework of environmental management provides an opportunity to analyze the issues of rationality, resource conservation and resource efficiency of production and technological units at the scientific and practical level, regardless of the forms and methods of production and economic activities.

The proposed environmental liability measures can bring real value in financial terms. This is possible through a waste management strategy at the business unit level to prevent their generation or minimization of waste. At medium-sized enterprises in the construction sector, the cost of recycling construction materials (including safety and regulations) comprised more than $ 15,000 per operating cycle. For medium-sized enterprises in the food industry (including safety and regulatory standards) it accounted for more than $ 7,000 per operating cycle. Therefore, at the country's level of economy, this is an element of waste management strategy in the environmental management system.

The results of this study are relevant to improving and modernizing a complex economy model of resource-saving green type, in particular, at the level of a business entity acting in the real sector of the actor economy. Since the International Standard ISO 14001: 2004 requires that companies identify environmental aspects of their activity, the authors offer management tools for resource management such as budgeting; control over the resource supply process; stimulation of resource saving policies by all participants at all stages of the production process. This approach should be based on a consistent account of factors, criteria and principles of resource conservation at all levels of management, purposeful improvement of existing management structures, and implementation of environmental management.

The scientific novelty of the research lies in improving the methodological tools of the company's environmental management, which are based on a comprehensive account of cause-and-effect relationships between changes in the environment and internal resources and management capabilities of the business unit. Such improvement is suggested in the context of continuous improvement of eco-management systems in the company, which is possible by extending the boundaries of its scope and, consequently, the degree of influence of the organization on the consequences of its activities and the environment as a whole. The eco-management toolkit has been improved through the use of integer linear programming to evaluate the level of resource efficiency of an individual business unit systematically and quantitatively. This makes it possible to further develop evidence-based recommendations for improving eco-management.

Conclusions

In the last decade, there has been an extensive environmental management trend. The environmental management system is the result of many years of experience and experiments in the management system of organizations, institutes and professional communities in a number of countries where the public authorities have been instrumental in this process. The introduction of EMS in businesses has a positive impact on the health and ecological culture of employees and the entire population across the territories adjacent to the organization.

EMS examines the production process in detail from the point of view of the negative impact on the environment through industrial waste management. To effectively address the industrial waste management issues, organizations are recommended to use the techniques focused on reducing environmental expenditures in the structure of production cost and motivating business entities to adopt the policy of resource conservation and waste treatment.

Based on the research results, the main prerequisites for implementing environmental management in industrial organizations have been identified. The mechanism for introducing environmental management components has been suggested as an important constituent of an organization's competitive strategy. The algorithm of selecting resource-saving measures within the environmental management of the organization has been presented. On the basis of the given algorithm, nature conservation measures within the construction and food industry organizations have been ranked. Considering the complexity of the connection between the functional elements of the eco-economic system and the material and raw-material flows, the place of waste in the reproduction system has been determined. This allowed justifying possible directions of industrial waste utilization in the organization and evaluating their impact on the results of economic activities.

Ensuring the development of a green economy when selecting the necessary tools requires considering the possibility to save material costs through returning industrial waste to production. Such measures influence the effectiveness of organizations, their social and ecological responsibility and are aimed at ensuring the health and social protection of future generations.

The proposed research findings have practical significance (already in use) in the context of large and medium-sized industry organizations of Ukraine. At the same time, the algorithm for selecting resource-saving technologies can be reproduced for organizations in different industries and used in different geographical locations. Since this research further extends the previous study, it focuses on practical resource-saving technologies in managing organizations. The research complements the experience that looks at management mechanisms related to resource-saving technologies that affect business performance.

Conflict of interest

There are no conflicts to declare.

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