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CIRCULAR PROCUREMENT MANAGEMENT IN THE CIRCULAR ECONOMY SYSTEM

Davydenko Volodymyr, Harmash Oleh, Ovdiienko Oksana. «*Circular procurement management in the circular economy system*». The article is devoted to the analysis of the possibilities of using the instruments of the circular economy. The article describes the theoretical and practical aspects of the circular economy. The article highlights the classical approaches to resource management in the system of a circular economy. Methods for managing the cyclicity of production and consumption are analyzed. Provides extensive explanations on how to manage production and consumption cycles. The main reasons that lead to the occurrence of resource losses are considered. The analysis of the basic tools and methods that can be applied in the implementation of the circular economy is carried out. The possibilities of obtaining benefits from the introduction of a circular economy are considered. The role of circular purchases in the system of circular economy is considered. The main directions of improvement in the circular procurement management system are determined. Critical aspects in the procurement management system have been identified. The analysis of the state of waste management in Ukraine has been carried out. The possibilities of using modern methods of circular procurement management have been analyzed. These are the classic circular procurement models. The main advantages of using circular procurement methods are proposed. Provided recommendations for further research in circular procurement management.

Keywords: circular economy, circular procurement, waste management, resource management, production cycling management.

Давіденко Володимир, Гармаш Олег, Овдієнко Оксана. «Управління циркулярними закупками, в системі циркулярної економіки». Стаття присвячена аналізу можливостей використання інструментів циркулярної економіки. У статті викладені теоретичні і практичні аспекти циркулярної економіки. Висвітлено класичні підходи до управління ресурсами в системі циркулярної економіки. Проаналізовані методи управління циклічністю виробництва і споживання. Надані розширені пояснення щодо методів управління циклічністю виробництва і споживання. Розглянуто основні причини, які призводять до виникнення ресурсних втрат. Проведено аналіз базових інструментів та методів, які можуть бути застосовані при запровадженні циркулярної економіки. Розглянуто можливості отримання переваг від запровадження циркулярної економіки. Розглядається роль циркулярних закупок, в системі циркулярної економіки. Визначаються основні напрямки вдосконалення в системі управління циркулярними закупками. Були визначені критичні аспекти в системі управління закупками. Проведено аналіз стану управління відходами в Україні. Проаналізовано можливості використання сучасних методів управління циркулярними закупками. Зазначені класичні моделі циркулярних закупок. Запропоновані основні переваги від застосування методів циркулярних закупок. Надано рекомендації подальших досліджень в області управління циркулярними закупками.

Ключові слова: циркулярна економіка, циркулярні закупки, управління відходами, управління ресурсами, управління циклічністю виробництва..

Давиденко Владимир, Гармаш Олег, Овдиенко Оксана. «Управление циркулярными закупками, в системе циркулярной экономики». Статья посвящена анализу возможностей использования инструментов циркулярной экономики. В статье изложены теоретические и практические аспекты циркулярной экономики. Освещены классические подходы к управлению ресурсами в системе циркулярной экономики. Проанализированы методы управления цикличностью производства и потребления. Предоставлены расширенные пояснения относительно методов управления цикличностью производства и потребления. Рассмотрены основные причины, которые приводят к возникновению ресурсных потерь. Проведен анализ базовых инструментов и методов, которые могут быть применены при внедрении циркулярной экономики. Рассмотрены возможности получения преимуществ от внедрения циркулярной экономики. Рассматривается роль циркулярных закупок, в системе циркулярной экономики. Определяются основные направления совершенствования в системе управления циркулярными закупками. Были определены критические аспекты в системе управления закупками. Проведен анализ состояния управления отходами в Украине. Проанализированы возможности использования современных методов управления циркулярными закупками. Указанные классические модели циркулярных закупок. Предложены основные преимущества от применения методов циркулярных закупок. Предоставленных рекомендаций дальнейших исследований в области управления циркулярными закупками.

Ключевые слова: циркулярная экономика, циркулярные закупки, управление отходами, управление ресурсами, управление цикличностью производства.

Introduction. As economic development grows, more and more countries around the world are joining the debate about the circular or closed-cycle economies.

The relevance of an implementing the circular system of the economic processes management in the economy contributes to the use of resources as long as possible, obtaining maximum value from the goods consumption, and in the future, the restoration of goods and materials from which they were made.

To date, a lot of research have been devoted to the circular economy. An important area for investigating is the chance for obtaining additional profits by enterprises, which is possible due to the minimizing materials related costs and the raw materials recycling.

The circular economy is not limited to the task of the waste recycling at the end of the product life cycle, but also provides opportunities for innovation and social development in the economic relations system.

The circular economy is considered as an economic model in which both the results and the processes of the resourcing and the production are planned and organized in a way to maximize a human well-being and the efficiency of an ecosystems [1].

The business' transition to a circular model should take place by organizing interaction in resource provision on a cascading basis, in which waste from one production is a raw material for another, thus reducing the amount of the generated waste, its reusing and recycling. This approach provides the considerable economic benefits, even despite the need for significant investments in the information interaction, as well as the creating of the efficient and high-quality waste management systems [2].

One of the circular economy tools is the circular procurement. The necessity to use special technologies for minimizing the use of new material and energy resources and to increase the utilization of secondary raw materials has begun to appear already at the product creation stage. Due to this approach a closed-cycle supply chain could be created, which would provide additional income.

Analysis of recent research and publications. The urgency of an exploring the circular approaches implementation is due to the limited global resources and the increasing of its consumption.

Research and development in the circular economy field focus mainly on some topical issues of logistics, production and processing technologies and provided in the works of W. Stahel, R. Lifset, G. Pauli and others [3-8].

Local researchers and scientists in the circular economy field mainly refer to the analysis of foreign experience.

The purpose and objectives of the paper. The purpose of this article is to consider the approaches for the introduction and management of the enterprise's circular processes as a component in the circular economy system.

Main materials and results. Circular economy can be considered as a concept based on the flow-process understanding of the nature of production, distribution, trade and consumption of goods in the socio-economic system and, accordingly, the turnover of resources and energy within this system [9].

The circular economy model involves the implementation of new approaches and methods, based on "smart" resource savings and goods reuse. This procedure assumes that companies should completely reconsider the management strategy of both the production and sales flows.

The introduction of this model was provoked by an increase in waste volumes worldwide. This trend increases environmental pollution and resource consumption.

The situation with waste in Ukraine is becoming dangerous. Almost 53 million m³ of household waste was generated in 2019 (excluding data from Autonomous Republic of Crimea and the city of Sevastopol), that corresponds to the more than 10 million tons of garbage, which are disposed of in 6,000 landfills with a total area of almost 9,000 hectares [10].

There is a need to introduce and maintain methods of circular economy in our country, considering the information from the State Statistics Service of Ukraine (Table 1) [11].

Table 1. Household and similar waste management

	2011	2012	2013	2014*	2015*	2016*	2017*	2018*	2019*
Collected HSW, thsd.t	10356,5	13878,0	14501,0	10748,0	11491,8	11562,6	11271,2	11857,2	11792,7
Removed HSW, thsd.t	7030,0	9362,7	9504,4	5893,8	6233,0	6089,5	6469,0	7171,2	7099,0

incl. to specially equipped dump	4321,5	5175,1	5178,5	3397,9	4194,3	4208,1	4417,5	4885,8	5043,6
Incinerated HSW for energy recovery, thsd.t	154,0	149,9	147,6	149,0	254,3	257,3	244,4	205,5	198,5
Incinerated HSW without energy recovery, thsd.t	98,5	78,6	2,9	3,8	2,1	2,0	1,2	1,0	1,0
Utilized HSW, thsd.t	74,5	57,4	9,4	3,8	4,0	6,5	16,5	16,7	0,1
incl. composted	3,7	0,0	0,4	0,0	8,2	7,9	0,0
Wastes per capita									
Collected HSW, kg	226,6	304,3	318,7	250,0	268,5	271,0	265,3	280,5	280,6
Removed HSW, kg	153,8	205,3	208,9	137,1	145,6	142,7	152,3	169,7	168,9
incl. to specially equipped dump	94,6	113,5	113,8	79,0	98,0	98,6	104,0	115,6	120,0
Incinerated HSW for energy recovery, kg	3,4	3,3	3,2	3,5	5,9	6,0	5,8	4,9	4,7
Incinerated HSW without energy recovery, kg	2,2	1,7	0,1	0,1	0,05	0,05	0,03	0,02	0,02
Utilized HSW, kg	1,6	1,3	0,2	0,1	0,1	0,2	0,4	0,4	0,00

** Data exclude the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and a part of temporarily occupied territories in the Donetsk and Luhansk regions.*

The disappointing results shown in the table 1 indicate an increase in waste volumes

each year. However, recycling or reuse remains at a low level (Table 2) [11].

Table 2. Waste generation and management

thsd.t	Volume of generated waste	Volume of recycled waste	Volume of incinerated waste	Volume of waste disposed of in specially designated places and facilities	Total volume of waste accumulated during operation, in specially designated places and facilities
2014	355 000,4	109 280,1	944,7	203 698,0	12 205 388,8
2015	312 267,6	92 463,7	1 134,7	152 295,0	12 505 915,8
2016	295 870,1	84 630,3	1 106,1	157 379,3	12 393 923,1
2017	366 054	100 056,3	1 064,3	169 801,6	12 442 168,6
2018	352 333,9	103 658,1	1 028,6	169 523,8	12 972 428,5
2019	441 516,5	108 024,1	1 059,0	238 997,2	15 398 649,4

** Data exclude the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and a part of temporarily occupied territories in the Donetsk and Luhansk regions.*

The frequency of the procurement can be reduced by the extension of the products' life cycle. At the same time, the costs of waste removal and disposal are reduced, as the volume of waste is diminished. And according to this governance at macro level faced the situation when the need to introduce the model of circular economy and its toolkit is obvious.

The development of the circular economy can be traced in relevance with the areas of expansion of the tool "R", as the basis

of the business model of methods of cyclical production and consumption management (Fig. 1).

One of the principles is to use the product or function which is needed instead of owning it. This format involves the establishment of relations between enterprises and consumers, the active use of instruments of lease and loan, i.e. the transition to a form of service, in contrast to the existing principle of "purchase and sale".

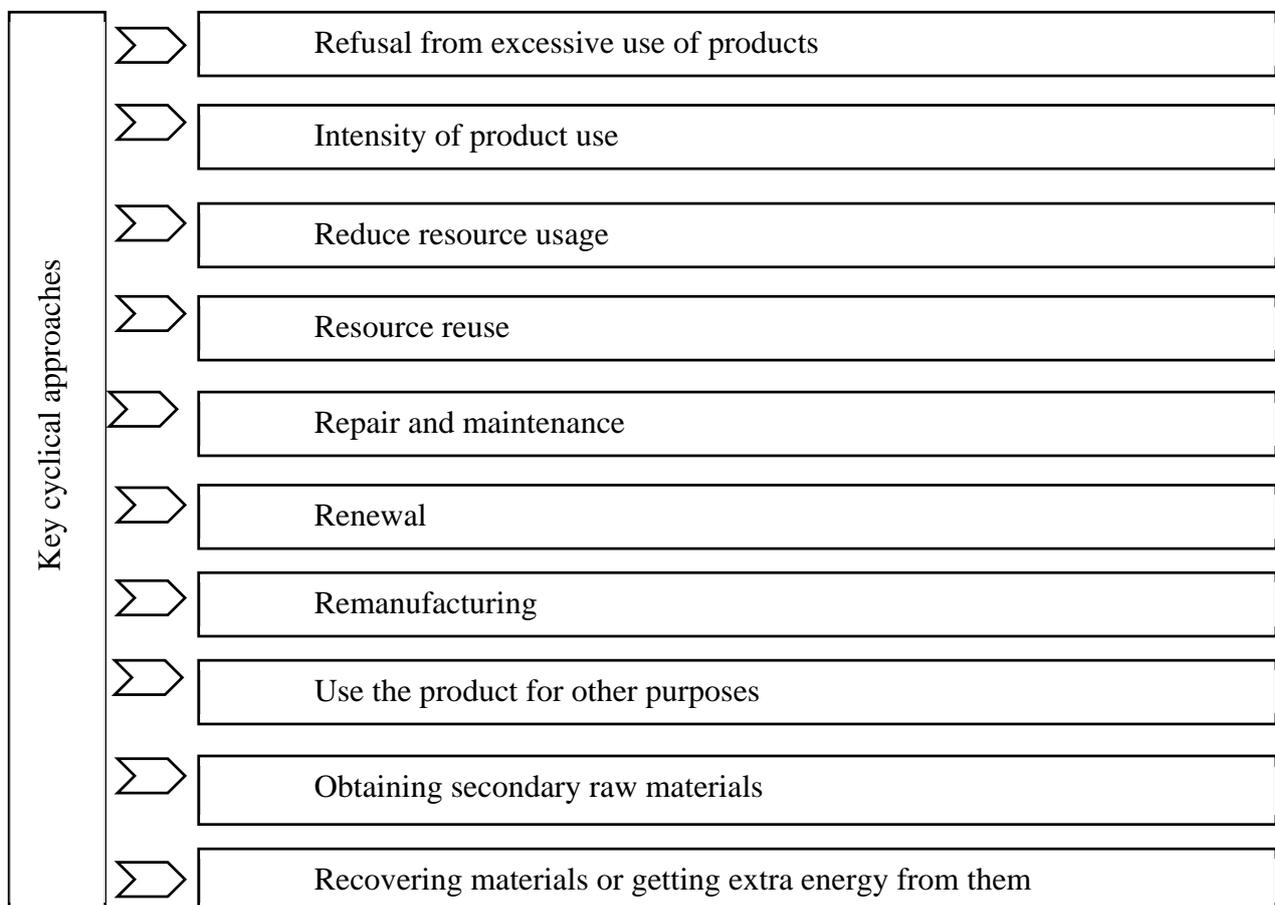


Figure1 – Methods of managing the cyclical nature of production and consumption
(Built by the authors based on [8])

The process of product sharing determines the possibilities of efficient use of tangible and intangible resources, in order to save costs. In addition, for some products, manufacturers are actively implementing the principle of sharing parts and components. As an example, a charger with a universal connector, or batteries.

Reuse of the product for initial or other purposes involves the search for alternative solutions to simplify service, and possibly provide the product with multifunctional properties.

Another approach is to maintain and repair the product to extend its life cycle. A special role is played by the possibility of easy

widening of the product potential, in case of obsolescence of its functional properties.

Progressive is the processing of used products to create new raw materials or goods. The development of such a cyclical process will not only create new types of commodities, but also generate additional jobs.

Along with the challenges of creating favourable conditions for the circular economy introduction there is the problem of lack of proper attention to other tools that acting as service elements of the gradual formation of new economic approaches. Namely, circular procurement.

The purpose of the circular procurement sustainability ensuring is to create long-term economic values for all stakeholders involved in the sale of goods and services on the market.

The circular procurement model launching could provide an opportunity to create "zero waste" conditions and the involvement of a significant part of the industry in this process, which would lead to the formation of a circular economy as a whole.

Circular procurement is a part of sustainable procurement, which is based on such principles of sustainability as recovery and cyclical use of resources.

Circular procurement can be defined as the process of purchasing of the goods, works and services by customers that helps to minimize energy and material losses in supply chains and also to avoid negative impacts on the ecosystem of the environment [12, 13]. This process involves the purchase of competitively priced goods, which increase the life cycle of products, their preservation and reuse.

Any manufactured products must be designed for durability, maintainability and recycling. After its main consumption purpose, the product must be reusable, have the ability to disassemble components, materials and raw materials that can be reused in new production.

The main approaches to circular procurement are not only reducing the costs on raw materials and diminishing waste volumes, but also establishing the conditions for closed production cycles and products.

There are different views on circular procurement in the scientific community, but today focus is put on three main models [12].

First model is based on the following processes. The supplier undertakes to buy from the customer the products previously provided to them. It could be realised after the expiration of the warranty period at a certain, agreed price. This approach creates the preconditions for products careful treatment by the customer and eliminates the need to address issues related to disposal.

Second model contain requirements according to which the customer sells the product after using to a third parties for further partial or full use. It is possible that in this model a third party will give the product other properties or create a new product.

Third model assumes that ownership remains with the manufacturer or supplier. In this case, the customer buys the service, not the product itself, or simply rents it. In this model the supplier will be fully responsible for maintenance and repair. The supplier and the customer are directly interested in this form of cooperation, namely, to minimize tangible and intangible costs within the agreements.

Any model of cyclic purchases usage allows to reduce customers' financial expenses. On the contrary, none of these models can guarantee a closed product cycle, as it is necessary to take into account market conditions and existing actors. These models are only a guide for modelling relationships in procurement.

Along with the application of these models, there is a need to use circular tools and environmental requirements for the efficient use of resources and at the same time, to meet the needs of all participants in the supply chain.

In the process of circular procurement, it is important to figure out clear requirements concerning the proper use of the materials,

the maintenance of the product in suitable state and conditions, as well as further action with the product after its expiration date.

Based on the analysis of the studied area, the use of circular procurement allows to achieve significant economic and social benefits:

- significant savings, by reducing the volume of purchases of new products and raw materials;
- reduction of waste volumes due to their transformation into new raw materials;
- reducing the use of imported raw materials;
- the possibility of using the saved resources in the development of lean production.

Conclusions. The lack of the necessary capacity for waste disposal in Ukraine, as well as the significant advantages of using circular

procurement in the field of resource, labour and energy savings, determine the feasibility of reorienting efforts to support these approaches. This should be facilitated by the interaction of business and government, which will simultaneously reduce the pressure on the environment, cut back resource consumption and create additional jobs.

The national economy should promote the formation of innovative solutions to ensure a harmonious social basis for sustainable development. Restructuring of the national economic system according to the principles of the circular economy can help to solve global and domestic problems with waste management by reducing production and distribution chains and increase their efficiency in terms of resource use.

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