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PRINCIPLES

OF CIRCULAR ECONOMY INTRODUCTION IN RUSSIAN INDUSTRY

PRINCIPIOS DE INTRODUCCIÓN A LA ECONOMÍA CIRCULAR EN LA INDUSTRIA RUSA

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ABSTRACT: The relevance of this article is conditioned by the need to take into account environmental risks, reduce the negative impact of industrial production on the environment. An effective tool solving these problems is the concept of a circular economy, which is a promising area of modern economic science. The purpose of this article is to determine the principles that enable the introduction of a circular economy in Russian industry. Using the methods of content analysis, the authors determined the origins of the studied concept in the USSR, as well as its relationship with the theory of sustainable development and the green economy. It is proved that the existing principles of industrial recycling, which define the concept of a circular economy, need to be supplemented, since they do not contain the description of the economic effects of their implementation in production. The authors indicated that the key principles are the principle of accounting and assessing the potential cost of waste, the principle of resource differentiation, the principle of saving from the use of renewable resources, and the principle of a product life increase. The developed principles are supplemented by the description of business strategies, the measures of institutional regulation, as well as the criteria for economic efficiency evaluation. The results of the study can be used to develop the strategies introducing a circular economy in industrial organizations.

Keywords: Circular economy, sustainable development, structural modernization, industry, circular economy principles

RESUMEN: La relevancia de este artículo está condicionada por la necesidad de tener en cuenta los riesgos ambientales, reducir el impacto negativo de la producción industrial en el medio ambiente. Una herramienta eficaz para resolver estos problemas es el concepto de economía circular, que es un área prometedora de la ciencia económica moderna. El propósito de este artículo es determinar los principios que permiten la introducción de una economía circular en la industria rusa. Utilizando los métodos de análisis de contenido, los autores determinaron los orígenes del concepto estudiado en la URSS, así como su relación con la teoría del desarrollo sostenible y la economía verde. Está comprobado que los principios existentes del reciclaje industrial, que definen el concepto de economía circular, deben complementarse, ya que no contienen la descripción de los efectos económicos de su implementación en la producción. Los autores indicaron que los principios clave son el principio de contabilizar y evaluar el costo potencial de los desechos, el principio de diferenciación de recursos, el principio de ahorro del uso de recursos renovables y el principio de un aumento de la vida del producto. Los principios desarrollados se complementan con la descripción de estrategias empresariales, las medidas de regulación institucional, así como los criterios para la evaluación de la eficiencia económica. Los resultados del estudio pueden usarse para desarrollar las estrategias que introducen una economía circular en las organizaciones industriales.

Palabras clave: Economía circular, desarrollo sostenible, modernización estructural, industria, principios de economía circular.

INTRODUCTION

The agenda of the World Economic Forum in Davos (2020) as the most important issue discussed for the first time included the need to take into account environmental risks. At the global level, it is recognized that centuries-old patterns of natural resource use require rethinking, and the current linear post-industrial economy needs structural transformation. The technologies that became widespread as the result of the Fourth Industrial Revolution - digitalization, the development of nano- and biotechnologies, 3-D printing, robotics, artificial intelligence - can significantly reduce environmental damage, but their implementation requires the improvement of this economic model. In this regard, the concept of a circular economy based on the idea of closed production can be an effective tool to solve existing environmental problems.

However, the transition from a linear economy to a circular one requires the transformation of the existing industrial system. An integral element in reindustrialization launch, the introduction of the fifth technological order should be structural modernization based on the principles of a circular economy, which will minimize the damage to the ecology of the country. Under these conditions, one of the most important scientific problems is the insufficient knowledge of the theoretical and methodological foundations, as well as the mechanisms that contribute to these structural changes in industry.

The issue of the circular economy origin is debatable. If the time frame is defined at the level of the 60-ies - 70-ies of the XX-th century, then the opinions differ concerning the basic work that gave rise to the concept. W. Stathel with his concept of "performance economy" is mentioned as the founder in a number of studies, the main essence of which is to achieve resource efficiency. Meadows, et al. (1972), considered reuse of waste, and its involvement in the economic turnover" (Jia & Zhang, 2011; Kudryavtseva, Mitenkova & Solodova, 2019). However, the consensus is that the theory of sustainable development makes the basis for a circular economy concept, and the green economy is its subsystem. The relationship between the goals of sustainable development theory, green and circular economies is presented on Figure 1.

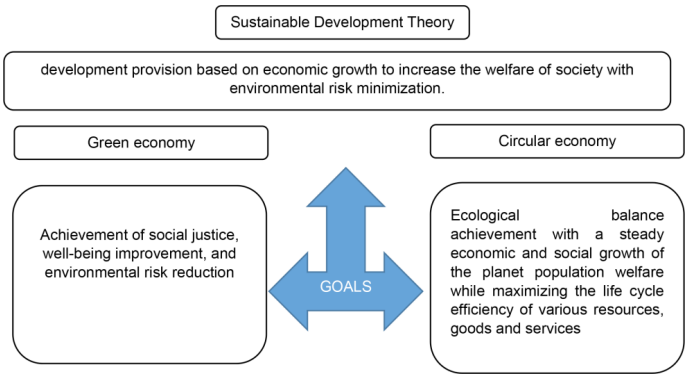

Figure 1. Triangulation of sustainable development theory goals for green and circular economy.

Source: Compiled by the author on the basis of Gurieva (2019); Alexandrova (2019); Kalchenko, et al. (2019).

The idea of the economical use of resources, the need to ration consumption of materials, is essentially new for Russia, the state with planned economy during 1917 - 1991. In a certain sense, the basic principles of a circular economy can be reflected in the structure of both the economic and political life of the USSR (Alabaeva, Velitskaya & Malakhova, 2019). The model of non-waste production, in our opinion, determines circular economy. But, despite the significant practical groundwork of the Soviet heritage in this field of research, the concept of a circular economy just begins to develop in the works of Russian scholars. At the same time, there is already a number of studies that address the topic of the concept of circular economy adaptation to Russian economic conditions (Vetrova, 2018).

The principles of the circular economy are still to be supplemented and clarified. The general concept that synthesizes the principles existing in the scientific literature is the concept of recycling, which refers to the reuse of materials in production (Sotova, 2019). The interpretation of these principles is presented in Figure 2.

Despite the fact that the presented list of principles is quite extensive, in our opinion, it defines the circular economy only from the point of view of production processes. However, the economy includes not only manufacturing agents, but also consumers, as well as their regulatory institutions.

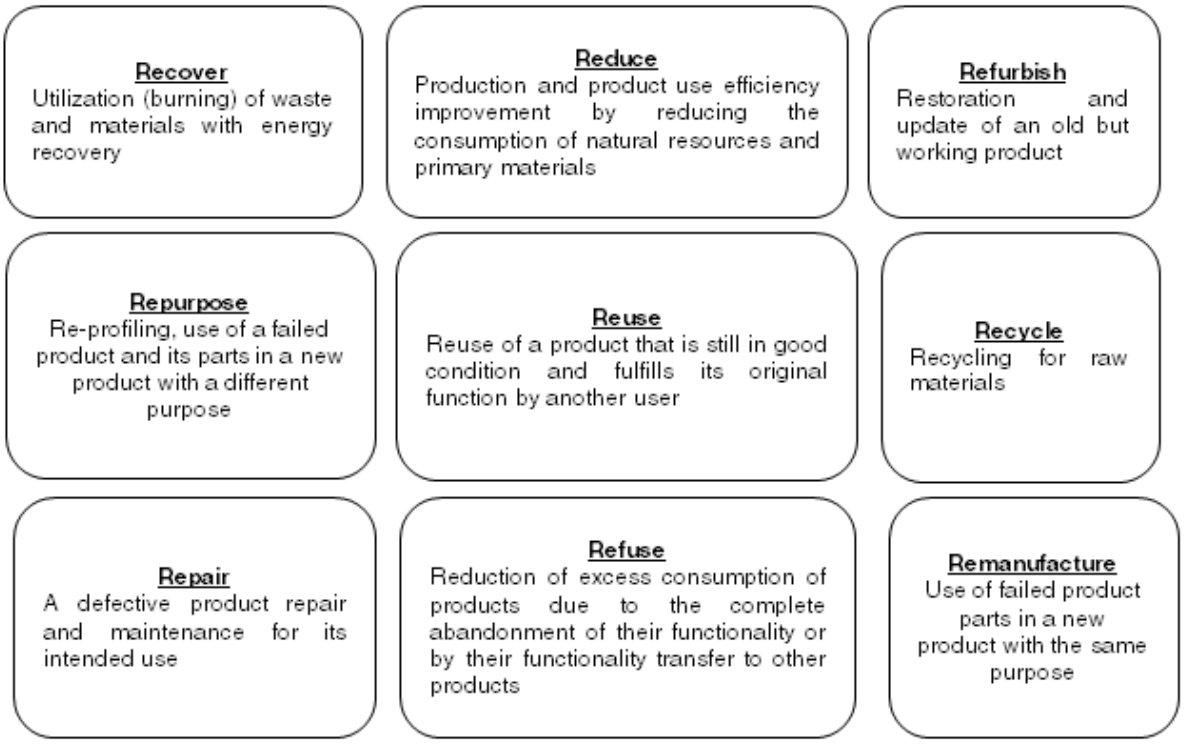

Figure 2. Industrial recycling principles.

Source: Compiled by the author on the basis of Sotova (2019); Frolova (2019); Petrov, et al. (2108); Efimov, et al. (2016).

Besides, the abovementioned principles have no justification for economic efficiency, while the environmental components of the production process are mainly described. This is more suitable for defining the principles of environmental industrialization than for a circular economy.

In this regard, the presented list of principles, in our opinion, needs to be expanded and supplemented. Clarification of these principles is the goal of this study.

Further, let's designate the principles of the concept of a circular economy in table 1, that we developed for their implementation in the Russian Federation industry and their essence, which, from our point of view, are fundamental to this process.

Table 1. The principles of the circular economy introduction in the industry of Russia.

Principle	Business strategy	Institutional regulation	Economic efficiency evaluation criterion
Accounting and assessment of the potential cost of waste	- environmental management; - PPP based on concession mechanism; - the system of green public procurement	- tax on production waste; - concepts of extended producer responsibility; - introduction of environmental tax; - subsidizing of regional waste recycling programs; - modernization of environmental infrastructure	- total cost of waste; - differentiation of waste in accordance with its potential value - profit from waste use

Resource differentiation	- industrial symbiosis; - agreement on joint activities; -work agreement; - contract of sale	- cluster policy (provision of tax preferences, financing the development and implementation of new innovative technologies, cluster member protection mechanisms from the risk of return on investment)	- the cost of primary resource replacement; - the price ratio between primary and secondary resources; - minimization of production costs
Saving on renewable resources	- innovations in the development of technologies for the restoration of resources; - development of environmental infrastructure	tax on the use of non-renewable resources; - privileges and preferences during reproduction of resource use; - financing of environmental infrastructure projects; - development of social and demographic policies; - refusal of personal income tax	- volume of non-renewable resource consumption; - savings from the use of renewable resources
Increased product life	- development of sharing platforms; - product as a service; - infrastructure for product repair and its component restoration	- certification, standardization and licensing; - legislative regulation of production resource recycling	- product replacement cost

The developed principles basically contain the principles of industrial recycling, which are considered from the point of view of the economic effect for industrial organizations planning their implementation in production.

1. The principle of accounting and assessment of the potential cost of waste

The production process of circular economy is considered not only from the point of view of profit increase for an enterprise and economic growth of the state, but also from the aspect of negative consequence reduction for the environment, which is significantly damaged by waste emissions. The need to implement this principle emphasizes the feasibility of planning the production process in terms of taking into account absolutely all stages of the product life cycle. Waste planning should be based on their potential value assessment and further ranking. As was noted by Petrov, et al. (2018), “the first, lowest level is the level of “potential” value in terms of their practical significance”. The second, higher level of waste value is the level of its “cost-effective” value. Third, higher level is the level of their “competitive” value. And the highest level is the level of their “investment value”.

2. The principle of resource differentiation

The resources that are not suitable for further use in the production are secondary, and can either be the source of the next production process, but for another company, or need to be disposed of. The value of resources used in production may also include environmental-economic and (or) socio-economic components (Vartanov, et al., 2017). Thus, the main economic indicators that can be used for a further use of resources: the cost of primary resource replacement; the cost of missed opportunities; price ratio between primary and secondary resources; minimization of production costs; profit from the use of waste.

The produced waste can be sold either in its own further production, or through the “by-product exchange network”, which is created on the basis of an agreement between producers. Interactions of this kind between industrial organizations are industrial symbiosis, and the network itself is an eco-industrial park or eco-cluster (Shashlo & Petruk, 2017). These production associations can be created as a separate legal entity or act without forming a legal entity under a joint activity agreement. At the same time, it is important not only to calculate the economic effect of secondary resource use, but also to take into account the market capacity and territorial component, since if transport costs for the delivery of purchased secondary resources are high, it is not only unprofitable, but also harms the environment.

The basis for institutional regulation of environmentally-oriented industrial association development should be a developed cluster policy, the main tools of which are the provision of tax preferences, financing the development and implementation of new innovative technologies, as well as the mechanisms which protect cluster members from the risk of return on investment.

3. The principle of savings from the use of renewable resources

Since any production consumes resources, it is necessary to take into account the period of their recovery. At the same time, nowadays geothermal energy, biomass, hydropower resources, energy of the sun, wind and waves are self-renewable resources. From an economic point of view, renewable resources are also labor resources, as well as the level of human capital development. In this regard, the state policy of social capital increase, the demographic situation improvement, the increase of investment in education, employment improvement, etc. - all this is the basis for a more efficient use of resources and corresponds to the conceptual foundations of a circular economy. An effective temporary measure of industrial organization stimulation to introduce environmentally friendly technologies can be the replacement of income taxes (corporate income tax, personal income tax) with the tax on non-renewable raw material sources, resources and energy use (Voronov, 2015). Tax system reforming can become an effective mechanism for unprofitable environmental initiative transformation into highly profitable ones, and it will also contribute to the goals of sustainable development - living standard improvement, population well-being increase, and unemployment reduction.

4. The principle of product life increase

Repeated handling of waste during production cycles reduces its suitability for future use. However, in any case, after the end of their service life, they should not leave their mark on the environment. Thus, the materials used in a closed production cycle should remain in the cycle without loss of quality, and the final product should be used as long as possible.

The development of unified state standards for industrial production, their certification in accordance with international standards, industrial line licensing - all these are the strategic guidelines to evaluate the durability of a manufactured product. At the same time, it is necessary to strive not only for the maximum service life of a product as a whole, but also for all its components, as well as provide for the possibility of their restoration and repair. The embodiment of this principle has become possible in the context of digitalization. The emergence of mobile applications in the field of “sharing” allows you to coordinate the actions of manufacturers and consumers to increase the durability of products.

Thus, within the framework of a circular economy concept, the determining factor of its development is the long-term effect, which consists in maintaining a favorable environment, renewing natural resources during human capital reproduction and social justice achievement.

The possibilities of modern industrial system restructuring into circular ones are determined by institutional regulation, which includes the legal framework, and, to a large extent, by the direction of state policy in industry, which requires determination of the organizational mechanism to introduce a circular economy in industry (Brovko & Petruk, 2016; Latkin, Maidanevych & Komarov, 2018; Osipov & Krasova, 2017). Despite all the advantages of a circular economy, which are mostly associated with intangible areas, its implementation should be economically feasible, efficient and effective.

CONCLUSIONS

Such principles as accounting and assessing the potential cost of waste, resource differentiation, saving from the use of renewable resources, the product life increase, observing which it becomes possible to propose alternative industrial development strategies that are recommended for consideration in developing an environmentally friendly strategic course are of primary importance for the introduction of a circular economy concept in Russian Federation industry.

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