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Economic Sustainability as a Basis for Circular Economy: Economic Growth and Reduction of Environmental Pollution

Temirbek S. Bobushev, Dinara M. Tursunalieva

Science Research Kyrgyz Economic University named after M. Ryskulbekov
Kyrgyz Republic, 720033, Bishkek
Togolok Moldo street 58,
Science Research Kyrgyz Economic
University named after M. Ryskulbekov Kyrgyz Republic, 720033, Bishkek
Togolok Moldo street 58,

Abstract
Economic sustainability is a key component of the circular economy, which focuses on balancing economic growth with environmental and social responsibility. The development of a circular economy promotes long-term financial stability and resource efficiency. Stimulating economic growth requires intensive use of environmental resources. In addition, the manufacturing process generates many by-products in the form of waste, which contributes to the production and emissions of greenhouse gases that degrade the environment. The processes of recycling waste from resource use, including the negative effects of increasing soil, water and air pollution, create a serious burden on the environment from economic activity. In this regard, the transition to a circular economy represents a new model of production and consumption that ensures sustainable growth over time. The transition to a circular economy is a new model of production and consumption that ensures sustainable growth over time. The circular economy ensures the optimized use of resources, characterized by a reduction in the primary consumption of raw materials and the use of waste through recycling.

Key words: circular economy, economic sustainability, economic growth, environmental pollution, waste recycling.

Introduction

Sustainable economic development is a process in which the use of natural resources, the direction of investment, the orientation of technological development, and institutional changes are coordinated and subordinated and increase both the current and future potential to meet the needs of people and society as a whole. In addition to the benefits of ensuring sustainable development of production, economic sustainability helps the environment by preserving and rationally using natural resources. Ensuring the effectiveness of the development of the circular economy is based on the principle of "less for more"[1,2021]. It focuses on the strategy of resource consumption through three processes: reduction, reuse and recycling, waste minimization and finding more innovative ways to produce goods and services. The solution to these problems can be achieved by moving to a model of production and consumption efficiency. The main components of such a model include: resources - production - consumption - waste. Particular importance within the framework of the analyzed model is given to the communication lines between the main components, determining the functions of the manifestation of one or another component and the zones of border areas between the components of the model, which determine the level and scale of transformation of the processes of economic development and sustainability.

Stimulating economic growth requires intensive use of environmental resources. In addition, the production process produces many by-products in the form of waste, which contribute to the production and emission of greenhouse gases that worsen the environment. The processes of recycling waste from resource use, including the negative effects of increasing soil, water and air pollution, create a serious burden on the environment from economic activity. The fact is that the quality of the environment and the socio-economic

development of the country are equally important components in the development of society. Unfortunately, this awareness comes after decades of environmental neglect: rapid and irreversible conversion of agricultural land, loss of unique plant and animal communities, and increased pollution of water and air resources. In this regard, in the area of economic development, in the framework of international trade and foreign economic activity, the country can use trade agreements and partnerships to encourage the use of advanced technologies and sustainable production methods. International trade, as one of the dynamic areas of economic sustainability, will promote innovation and competition in environmentally friendly industries, thereby accelerating the transition to a sustainable economy and economic growth. Sustainable economic growth, in turn, ensures the quality of life of people by preserving the natural state of the environment through activities that, on the one hand, prevent the depletion of resources and pollution of the environment itself, and on the other, ensure optimal productivity while preserving the environment.

Materials and Methods

The efficiency of the development of the circular economy as the basis of the modern trend of economic development is a way to promote sustainable development by reducing resource consumption and increasing waste recycling, by keeping materials in use as long as possible. Such a system of economics involves minimizing the production of waste from final resources, using a management model, which is based on three main components: reduction, reuse and processing. The structure of the model: resources - production-consumption-waste, the content of which is the basis of the development strategy, allows separating economic growth from environmental degradation.

The Central Asian countries, including the Kyrgyz Republic, are at the initial stage of transition to a circular economy, which is explained, first of all, by the low level of recycling of the resources used. In the Kyrgyz Republic, there are relatively insignificant volumes of waste generation per capita, and the level of recycling of various wastes is characterized by low values [2,2024]. Taking into account the above, we propose to turn to the analysis of problems and limitations in relation to the transition to a circular economy. However, the analysis of the named problems may be complicated by the absence or insufficiency of data on the assessment of the level of waste production within various industries and the economy of the country as a whole, which is the main problem of resource management and waste production.

In general, waste management, due to the insufficient level of development of the policy and infrastructure for the secondary use of resources, including the lack of a waste data system, can be characterized as insufficiently structured and requiring a qualitative transformation of the entire system of use and processing of resources based on the concept of economic sustainability. The lack of open materials on the production and processing of waste creates various limitations in their widespread use and the development of environmental protection measures. Naturally, the lack of complete information on sources and volumes of waste production has led to the insufficient development and implementation of national standards for the production and use of waste.

The external manifestation of the negative impact of waste on the environment are various types of soil, water and air pollution. Among the most common causes of soil pollution caused by human activity, FAO identifies industry, mining, military activities, waste (including process waste) and wastewater management, agriculture, livestock farming, construction of urban and transport infrastructure. It should be noted that the soil acts as a filter for pollutants, but its buffering capacity is finite. At the same time, various levels and distribution of soil, air and water pollution create serious risks to public health and negative impacts on the environment. This state of affairs, in addition to addressing the issues of implementing the principles of a circular economy, requires the widespread use of data on air, water, soil and other environmental pollution and the development of proposals for their adequate economic transformation.

Results and Discussions

So, let us move on to the results of the analysis of waste production and management, development of standards and policies for the control of waste production and recycling. First of all, it should be noted that it is necessary to distinguish between two main categories of waste, which can be established taking into account existing standards, mainly international, based on various legislative acts and policy instruments and which are divided into: non-hazardous or solid waste and hazardous waste. In detail, such classification includes the following types of waste: municipal solid waste, non-hazardous industrial waste, agricultural

and livestock waste, medical waste, hazardous radioactive waste, construction and food waste, mining waste, oil and gas production waste, fossil fuel combustion waste, etc.

For the Kyrgyz Republic, in comparison with other Central Asian countries, the volume of waste does not seem catastrophic today and includes mainly electronic waste, the sources of which are used televisions, computers, mobile phones and any types of household appliances, from air conditioners to children's toys. For example, the volume of such waste in the Kyrgyzstan in 2019 was 10 kilotons (kt) per year, or 1.5 kilograms (kg) per person per year, which allows us to calculate the level of official collection and recycling of electronic waste in the region of about 0.1% [3, 2024]. At the same time, due to the relevance for Kyrgyzstan, the problems of collecting and recycling electronic waste are regulated by national legislation in the field of waste in general and electronic waste in particular [4, 2018]. However, despite the presence of a serious legislative framework for waste management, which is based on measures for waste from production and consumption [5, 2023], as well as the introduction of a waste inventory, compliance with recycling standards by entities producing goods in the Kyrgyzstan, as well as when importing goods from underdeveloped countries, there are practically no directions for the development and implementation of waste recycling and recycling technologies into practice.

Perhaps the current situation with waste control and use is explained by the small volumes of waste production. However, it is precisely this circumstance that gives our country a unique opportunity in that at present there is an opportunity to develop and implement a new infrastructure for the accounting, control and regulation system, and to implement international and develop national standards in the production and recycling of waste. The solution to such a problem should not be limited only to legislative and legal protection of the environment, which is, of course, important in itself, but also to the development of a scientifically based system for the classification of waste produced and, what is very important, their processing and recycling. It should be noted that the development of waste management systems should contain guidelines, practices and testing methods related to the process of handling industrial, commercial and household waste. This process includes the collection, transportation, treatment and recycling or disposal (as applicable) of waste for medical, environmental and/or aesthetic purposes. These waste management standards and decision-making on waste use and recycling should be provided by municipal property bodies, not by republican institutions, as is the case in the Kyrgyz Republic. We believe that the powers and functions for waste recycling and reuse should be transferred to local authorities, which in their activities should be guided by laws and regulations developed and proposed by the country's parliament. Such transformations could enable a transition to a circular economy, which would see recycling businesses grow as the economy develops. At the same time, such a transition will facilitate not only the solution of issues of waste placement and disposal for individual materials, but also the entire waste system produced by all sectors and objects of economic activity in the territory of the Kyrgyz Republic. Within the framework of the circular economy, it will be possible to develop national standards for waste produced and their secondary use. This approach requires the use of complex and interconnected cooperation between all economic units and business entities of the country. Ultimately, the development of a waste management policy from production and consumption in the Kyrgyz Republic will gradually lead to a wide reduction and recycling of waste. As an example, we can turn to the experience of Singapore, which focuses on two main areas: waste minimization and recycling, which is based on the 3 R algorithm – Reduce, Reuse, Recycle [6, 2025]. Given the limited territory in Singapore’s, the government of this country widely uses various technical solutions, including waste incineration plants for processing waste into energy, producing new goods, etc. Drawing on the experience of Singapore and other countries, we propose a waste management model whose key components include: resources – production – consumption – waste. (Fig. 1)

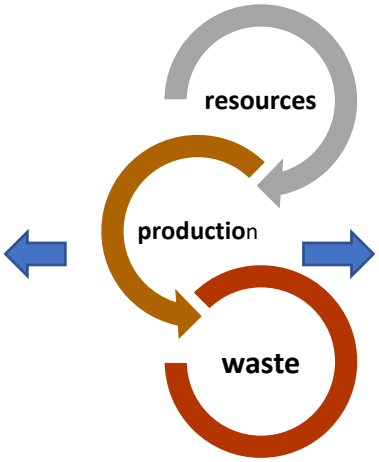

Fig. 1. Model of the relationship between resource use, production and waste (adapted to this publishing).

A special role in the properties of this model belongs to the communication lines between the main components, determining the functions of the manifestation of one or another component and the zones of border areas between the components of the model, which determine the level and scale of transformation of the processes of economic development and sustainability. The extraction and use of resources is almost always accompanied by the creation of a certain amount of waste, although in general the resources obtained are directed to the production of materials and things that determine the level and volume of consumption. Subsequently, at the next stage, part of the products of production and consumption is transformed into waste. As part of sustainable economic development, there is a need to process waste towards its reuse as resources or complete recycling. All these measures can eventually gradually lead to a reduction in environmental pollution.

Along with technical solutions in the field of waste recycling, the use of technological methods for waste processing and obtaining both new materials and products, and reducing environmental pollution is becoming especially relevant. At the same time, it is necessary to introduce methods and principles for sorting various types of waste, since the use of various sorting systems is an important stage in preparing waste for its processing and reuse. This is related to solving the ultimate problem of recycling waste for the purpose of recycling or production of various products. The importance of separation or sorting of waste for its reuse is closely related to the following types of its technological transformation: a) plastic, which is recycled for reuse in applications with lower quality requirements, b) metals, which are recycled for reuse, 3) organic matter, which is further processed into fertilizer by composting or biogas by anaerobic digestion, 4) combustible substances, which are also further processed into waste-to-energy fuel and, 5) inert substances, which are not used and are subject to burial.

In the Kyrgyz Republic, a more extensive classification of waste is used, which, from the point of view of their secondary use, requires detailed study.

Table 1.: Accumulated volume of production and consumption waste in Kyrgyzstan, including hazardous waste, by waste hazard classes for 2017 - 2021 [7, 2022].

	2017	2018	2019	2020	2021
Production and consumption waste, kt/year They include:	128,420	2,130,54	2,275,789	2,383,153	2,589,713
Waste of the first hazard class (extremely hazardous)	0,3	0,3	0,3	0,3	0,2
Waste of the second hazard class (highly hazardous)	-	126,873	129,167	134,313	139,345
Waste of the third hazard class (moderately hazardous)	25,8	17,4	39,6	46,6	40,1
Waste of the fourth hazard class (mildly hazardous) -	-	-	2,000,832	2,141,421	2,243,758

By the way, this direction of economic activity in the Kyrgyz Republic within the framework of the circular economy can be quite attractive both for state enterprises and for the business sector, both international and local, with the attraction of additional investments in this area of the economy.

In addressing issues of improving policies and practices in implementing processes to stimulate waste reduction and reuse, financial measures are traditionally used, which, unfortunately, mainly affect the system of fines and penalties. Despite their certain effectiveness in solving some issues, we believe that tax breaks for reducing waste and its reuse for existing enterprises, business companies and sectors of the economy in general can play a significant role and lead to positive results not only in the comprehensive use of waste, but also in improving the environment.

A special place in the waste recycling policy, within the framework of the implementation of the circular economy, should be given to the system of education and informing the population about the need for recycling and reclamation of territories for the purpose of environmental protection, which in itself can also constitute an economic effect from the implementation of the principles of the circular economy and ensuring economic sustainability.

Conclusions

A feature of the structure of a closed economy, graphically presented in Figure 1, is the greatest interconnection that is found between the components of production and waste. On the one hand, waste is an almost obligatory result of production; on the other hand, the production of waste, depending on its volume and variety, indicates high-quality production, which is characterized by the least expenditure of resources and the production of a minimum amount of waste. Ultimately, waste is an integral part of the production process, due to which it becomes possible to evaluate production and the efficiency of resource use for production.

Another connection is found between consumption and waste. Since it was stated that waste is a part of production, then on the basis of waste it is possible to envisage the production of both consumer goods, new materials, substances, and the rational use of resources. From this it is possible to come to the preliminary conclusion that in the system resources - production - waste - consumption a special place is occupied by the component of the system waste, with the help of which it is possible to conduct both an assessment of the quality of production of various objects, materials, products, and the degree of use of resources in production. Moreover, waste as a part of production itself can act as resources, the secondary use of which allows to "restart" the production process. The only question is what technological solutions are used in this process.

Sustainability in economic development involves the economical or rational use of resources in the high-quality production of a wide range of materials, substances and products, which also involves waste. It is waste, its production, volumes that can allow us to determine not only the relationships between the main components of the system, but also to assess the possibilities of expanding production with minimal use of primary and active involvement of secondary resources in production. In accordance with the opinion expressed by the authors, there is a doubt about the need for a wide use of the concept of economic growth. This is explained by the fact that traditionally, an indicator of economic growth is always considered to be the achievement of a high level of production, which uses a large volume of natural resources. Despite the popularity of the indicator of economic growth, against the background of economic sustainability, one should remember not only about achievements in production and consumption, but also about the preservation of the environment. The solution to such a problem does not always coincide with the content of the concept of economic growth. Therefore, the balance between economic development and environmental protection within the framework of economic sustainability can be achieved, among other things, by transforming the concepts of economic growth, as well as waste, which should be considered as an obligatory element of production, just like resources. Waste should be seen as a new resource for production and at the same time a resource for the environment, for example, the creation of “new” soil, which subsequently, by absorbing chemical elements such as carbon, etc. from the atmosphere and water, can contribute to the reduction of greenhouse gas emissions. The existing "subjective" idea of waste, in a negative sense, has created incorrect ideas in the production economy, which, against the background of the concept of economic sustainability, should gradually give way to a closed-loop economy, which will ensure a successful transition to a circular economy system and increased environmental and social responsibility of

manufacturers of various products for a wide range of consumers. Such a transition, in addition to changing the “priorities” of economic development, can contribute to the use of new ideas and new concepts in economic development, and possibly the development of new areas of economic science, which include, for example, physical economics.

Conflict of Interest statement

We declare that we have no conflict of interest

References

1. Hwong-wen Ma. Circular Economy and New Research Directions in Sustainability. In book: Pursuing Sustainability, OR/MS Applications in Sustainable Design, Manufacturing, Logistics, and Resource Management, 2021, pp.141-168. DOI:10.1007/978-3-030-58023-0_6
2. Circular Economy as an Opportunity for Central Asia. Summary Report, May 2024. The World Bank Group, 1818 H Street NW, Washington, DC 20433, USA.
3. National E-waste Monitor, Kyrgyzstan, 2024
4. National Development Strategy of the Kyrgyz Republic for 2018-2040. Bishkek, 2018, pp.49-50.
5. Law of the Kyrgyz Republic "On Production and Consumption Waste", 2023, Bishkek.
6. Clean &Green Singapore, Last Update 17 Mach 2025.
7. Data of the National Statistical Committee of the Kyrgyz Republic on availability of wastes of I-IV hazard classes. https://www.stat.kg/ru/statistics/ turizm-otdyh-ohrana-okruzhayushej-sredy/.