THE RELATIONSHIP BETWEEN SUSTAINABILITY AND ECONOMIC GROWTH: A CIRCULAR ECONOMY APPROACH

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INTRODUCTION

Relevance. The issue of waste management is becoming increasingly pressing due to the rapid growth of the global population, the rise of consumerism, and the continued dominance of the linear economic model (D'Amato et al., 2016; Stoeva and Alriksson, 2017; De Feo et al., 2019). The linear economy, based on the "take–make–dispose" principle, has long served as an effective model for industrial development during a period when natural resources were perceived as abundant. However, demographic, economic, and environmental trends have revealed that this model is no longer sustainable. Intensive production and consumption have led to a growing demand for raw materials, accelerated ecosystem degradation, and a critical increase in waste generation, posing significant threats to the environment as well as to human and animal health.

Research problem. The transformation from a linear to a circular economy has become essential to ensure the rational use of natural resources and to reduce their depletion. Due to rapid economic growth and intensive consumption, global natural resources are declining at an accelerating rate, making the traditional "take–make–dispose" model unsustainable. Although this model has long supported corporate profitability and economic expansion, it has simultaneously contributed to irresponsible consumption and resource overexploitation. The development of a circular economy enables not only the recovery and conservation of resources but also the creation of a more energy-efficient, innovative, and environmentally friendly economic system. Such a system provides opportunities to align economic, ecological, and social objectives in pursuit of long-term sustainability.

The aim of the research is to identify and assess the impact of circular economy factors on the economic growth of the Baltic States.

Tasks:

1) to identify the relationship between the circular economy and economic growth;
2) to determine and evaluate the impact of the circular economy on the economic growth of the Baltic States.

Research methodology. Methods: analysis and synthesis of scientific literature, correlation regression analysis. The dependent variable is GDP per capita in the Baltic States, associated with the economic growth of Lithuania, Latvia, and Estonia. Four independent variables are examined.

Theoretical assumptions

For a long time, industrial enterprises paid little attention to waste recycling and the implementation of circular economy principles, as such practices were not considered economically attractive. Under the prevailing linear economic model, profit maximization often took precedence over sustainability objectives. Consumers, in turn, tended to purchase new products rather than repair or reuse existing ones. This behavioral pattern encouraged excessive consumption, increased waste generation, and deepened environmental pollution while failing to address the problem of resource scarcity.

The concept of the circular economy fundamentally changes this perspective by aiming to establish a closed-loop system in which waste becomes a resource for new production processes. In this model, waste is viewed as a potential resource, and its reuse reduces the demand for natural raw materials, contributes to pollution reduction, and fosters technological and organizational innovation. The development of the circular economy is based on sustainability principles, including prevention, reuse, recycling, refurbishment, and waste-to-energy technologies.

In recent years, growing attention has been devoted to reducing environmental pollution and conserving natural resources. Empirical studies confirm that waste prevention and recycling directly contribute to lower resource consumption and reduced greenhouse gas emissions. Waste reduction is also associated with higher energy efficiency and the expansion of the circular economy, in which value chains are maintained for as long as possible and raw materials are used repeatedly.

In response to these trends, governments and the business sector are implementing new technologies for waste recycling, energy recovery from waste, and the extraction of secondary raw materials. These include biodegradation processes, waste sorting, waste-to-energy systems, and innovative packaging and manufacturing solutions that reduce the need for primary raw materials. At the same time, companies increasingly adopt eco-design principles, while raising consumer awareness and changing consumption behavior have become integral elements of this transformation.

Nevertheless, although the circular economy is regarded as a sustainable alternative to the traditional linear model, its implementation faces numerous challenges. The main barriers include technological and economic constraints, the slow pace of behavioral change among consumers, and varying political approaches to the adoption of sustainability principles. Moreover, there are still no universally established criteria or standards for evaluating the effectiveness and sustainability of the circular economy. Despite these challenges, it remains essential to examine which circular economy factors contribute to economic growth and how they can support the development of long-term sustainable growth strategies.

Research results

From 2005 to 2022, GDP per capita in the Baltic States demonstrated a clear upward trend. Lithuania experienced the fastest economic growth, with GDP per capita increasing 3.8-fold over the period, corresponding to an average annual growth rate of 8.1%. In Estonia, GDP per capita increased 3.3-fold, with an average annual growth of 7.2%. Latvia, in comparison with the other two Baltic countries, exhibited more moderate economic expansion, with GDP per capita rising 3.2-fold, also at an average annual rate of 7.2%.

Positive developments in circular economy practices were observed throughout the Baltic region. Between 2005 and 2022, Lithuania, Latvia, and Estonia experienced growth not only in the recycling of packaging and plastic packaging waste but also in municipal waste recycling and, in most cases, in the share of employment in circular economy sectors (except for Latvia). Lithuania demonstrated particularly significant progress in municipal waste recycling, with the rate increasing from 1.9% in 2005 to 48.9% in 2022. Estonia also showed an upward trend in municipal waste recycling, although the increase was less pronounced, while Latvia recorded a gradual improvement. Regarding packaging waste recycling, Lithuania and Estonia achieved faster growth compared to Latvia during the study period. Recycling of plastic packaging waste increased in all three countries, with nearly half of such waste being recovered. The proportion of employment in circular economy sectors increased in Estonia and Lithuania, whereas in Latvia it declined; however, in Latvia, the overall share of employment in these sectors remained relatively low, not exceeding 5% of total employment.

Panel data for the Baltic States revealed strong and moderate relationships between circular economy variables and economic growth in the region. The strongest correlation was observed between GDP per capita and packaging waste recycling, indicating that a more favorable economic situation is associated with more advanced packaging waste management. The municipal waste recycling rate also shows a positive effect and exhibits a particularly strong correlation with economic growth. Moderate correlations were identified between plastic packaging waste recycling, the share of employment in circular economy sectors, and economic growth. The impact of independent variables on economic growth is expressed by the regression equation:

$$Y = 6.16 + 0.26X1 + 0.71X2 + 0.16X3 + 0.31X4$$

where Y denotes GDP per capita (EUR); X1 – municipal waste recycling (%); X2 – packaging waste recycling (%); X3 – plastic packaging waste recycling (%); X4 – share of employment in circular economy sectors (%).

CONCLUSIONS AND RECOMMENDATIONS

Positive developments in the circular economy are evident across the Baltic States. Between Lithuania, Latvia, and Estonia, there has been a significant increase not only in the recycling rates of packaging and plastic packaging waste but also in municipal waste recycling. Additionally, the proportion of employment within circular economy sectors has expanded, with the exception of Latvia, where this growth has not been observed.

The panel data analysis revealed that economic growth in the Baltic States (GDP per capita) is statistically significantly influenced by circular economy factors. Municipal waste recycling, packaging waste recycling, plastic waste recycling, and the share of employment in circular economy sectors not only exert a positive effect but also demonstrate a strong correlation with gross domestic product per capita.

LITERATURE

1. D'Amato, A., Mancinelli, S., & Zoli, M. (2016). Complementarity vs substitutability in waste management behaviors. *Ecological Economics, 123, 84–94.*
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