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Product Life Cycle Analysis in Uzbekistan: A Sustainable Approach

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ABSTRACT

This study explores the concept of product life cycle analysis (PLCA) in Uzbekistan, focusing on its role in sustainable economic development. By examining the different stages of a product's life—raw material extraction, production, distribution, consumption, and disposal—this research evaluates the environmental and economic impacts of industrial activities in Uzbekistan. The study highlights the challenges and opportunities in transitioning toward a circular economy, emphasizing waste reduction, resource efficiency, and green innovation. It also examines how businesses, policymakers, and consumers can contribute to sustainable development through improved product life cycle management.

Keywords: circular economy, linear economy, supply chain, industry, environmental protection, gas emissions, value chains, solid household waste.

Introduction

Industrial enterprises play an important role in the economic development of any country. They have a positive impact on society by creating jobs, increasing the country's domestic product, and ensuring technological progress. At the same time, industrial development can have a significant negative impact on the environment. Today, maintaining a balance between industrial development and the environment is considered an important environmental and social issue at the global level. Waste, chemicals, and other harmful products generated as a result of the activities of industrial enterprises can cause serious damage to the natural environment.

In our country, consistent work is being carried out to protect the environment, in particular, to improve the ecological situation by reducing the impact of industrial enterprises on the environment. At the same time, the results of the analysis conducted in this regard indicate the need for an integrated approach to environmental protection issues and the introduction of effective and modern methods of strategic planning in industrial enterprises. The circular economy minimizes waste and pollution. It seeks to achieve a circular economy at all stages of the supply chain, from production to consumption, including repair and recycling, waste management and the production of secondary raw materials. The circular economy is a model of resource production and consumption in any economy that involves sharing, renting, reusing, repairing, repurposing, and recycling materials and products for as long as possible. The concept aims to address

global challenges such as climate change, biodiversity loss, waste, and pollution, and emphasizes the design-based implementation of the model's three core principles. The three core principles necessary for transitioning to a circular economy are: design-based waste and pollution, conservation of products and materials, and restoration of natural systems.

The circular economy contributes to resource efficiency and sustainable economic development by using its core principles to achieve strategic advantage, in which companies strive to reduce environmental burdens and improve the economic aspects of their activities. The circular economy has a number of advantages in this regard, including.

- Environmental
- Develops the national economy
- Increases labor productivity
- Ensures resource sustainability

The circular economy is the opposite of a linear economy, in which "waste" serves as a resource and is reintroduced into the production process. In a circular economy, products are used for as long as possible, regenerating natural systems. The concept of the useful life of products, reuse, and recycling principles work. The circular economy includes other methods of production in addition to the linear model. It should be noted that in the scientific literature, foreign researchers have conducted research on the implementation of circular economy models in the development of industrial enterprises. Frank, Rajput and Singh, Suárez-Eiroas¹ argue that the circular economy and Industry 4.0 are the two main industrial paradigms that have been driving industry in recent years and encourage business organizations to transition to innovative supply chain models that offer a new vision of production and consumption.

Analysis results. Currently, the extraction and use of raw materials accounts for 70% of global greenhouse gas emissions. By making the most important industrial materials (cement, steel, plastics and aluminium) more efficient and circular, we could reduce global greenhouse gas emissions by 40% by 2050. By adopting circular economy approaches in the food industry, we could reduce global greenhouse gas emissions by 49%. According to the Circular Gap Report, the circular economy currently accounts for 7.2% of the global economy. In Uzbekistan, the widespread introduction of circular economy technologies is also an important issue in the development of industrial enterprises. As the main criterion for the introduction of a circular economy, great attention is paid to waste recycling and reducing its impact on the environment. In 2019, the "Strategy for the Implementation of Work Related to Solid Waste in the Republic of Uzbekistan for 2019-2028" was approved, which provides for the creation of an effective and modern system for the recycling of solid waste. The strategy envisages achieving such target indicators as ensuring the recycling of at least 60 percent of generated solid waste, increasing the volume of recycling of solid waste with specific characteristics by up to 25 percent, and reducing the volume of solid waste buried in landfills by up to 60 percent. According to the analysis, Uzbekistan generates about 14 million tons of waste per year, of which 4-5 percent is recycled. Current waste management practices lead to the release of more than 7 million tons of greenhouse gases in landfills and the leakage of 43,000 tons of toxic leachate into the ground. In Andijan and Tashkent regions, 4 thousand tons of waste are processed per day, producing 630 million kilowatt-hours of electricity per year. In Samarkand and Qashqadaryo regions, 3 thousand tons of waste are processed per day, producing 480 million kilowatt-hours of electricity per year. In Bukhara and Navoi regions, 1,500 tons of waste are processed per day, producing 363 million kilowatt-hours of electricity with an investment of 200 million dollars. Through the implementation of the circular economy in our country, it is aimed to incinerate more than 4.7 million tons of waste, generate 2.1 billion kilowatt-hours of electricity, and save 152 million cubic meters of natural gas, effectively using solid household waste. This will reduce harmful gas emissions by 2.4 million tons and create 1,200 new jobs.

Conclusion and suggestions

The introduction of circular economy practices in industrial enterprises involves the introduction of new, modern, low-waste technologies into industrial enterprises and a series of actions aimed at reducing emissions into the environment. The work carried out in this area is of great importance in the development of the economy, ensuring environmental protection in the face of anthropogenic and technogenic impacts on nature. In order to achieve these goals, it is necessary to take action in the following priority areas:

1. Formation of ecological infrastructure and widespread introduction of circular economy practices in industrial enterprises.
2. Development of measures aimed at sharply reducing greenhouse gas emissions in industry.
3. Provision of special benefits for industrial enterprises that introduce environmentally friendly and safe technologies.

Based on the above, the circular economy, in addition to reducing waste, also contributes to reducing pollution. It significantly reduces the environmental pollution associated with the production of new products, including air and water pollution and carbon emissions. In addition, the circular economy, in addition to preventing environmental pollution, makes it possible to save resources, preserve biodiversity, create sustainable production and consumption patterns, combat climate change, introduce innovations in these areas, develop businesses and create additional jobs. By focusing on renewable resources and energy, the circular economy helps to mitigate the impact of climate change.

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