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THE CONCEPT OF THE CIRCULAR ECONOMY AS A DIRECTION OF INCREASING THE COMPETITIVENESS OF A COMPANY

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N. Meshko, A. Nikolaienko. The concept of the circular economy as a direction of increasing the competitiveness of a company. In the article author examines a concept of circular economy showing that it lays the foundation for global stable development. A new business model will take into account the need for easy product maintenance, reuse and further processing from the very start. There is a growing trend of investments in circular economy, but the largest contributors are waste collection and processing. The main prerequisites for the circular economy as a necessary business model were identified including lack of fossil fuels and the limited availability of all types of natural resources, the increase of the consumers of the middle class, the new opportunity of problems resolution with the help of "big data" concept, legislative changes and management globalization, etc. A number of issues arise concerning the environmental effects of circularity of plastic products in Europe and the US which islargely materialized through international transportation with initial point of production in China.

Keywords: circular economy, linear economy, material recycling investments, circular efficiency, re-use, reducing CO2 emissions

The concept of the circular economy was introduced in 1990 with the view on the strategy of sustainable development and was proposed to solve the current problems of environmental deterioration and the lack of resources. The circular economy operates according to 3R principles: Reduce, Reuse, and Recycle [6, 11]. But along with this, in the context of the problem studied, the author proposes to consider the fourth principle – global social corporate responsibility (Responsibility) – as mandatory in the formation of global circular chains of added value. creation

The current level of resource consumption is unstable, both for society and for business, since it depends on the availability of natural resources in the current linear model of the economy.To achieve and maintain balance in the planet's ecosystem, the concept of sustainable development has been developed and is being actively promoted, which includes three areas of action: economic, social and environmental. And one of the essential conditions for achieving sustainable development is the transition to the most responsible model of production and consumption - the circular economy.

Analysis of recent research and publications and allocation of previously unresolved issues

Foreign scientists have devoted their work to the problem of resource, in particular, material, productivity (or efficiency) – Pujari D. [1], DriessenP. [2], Geiser K. [3], Rusniko CA [4], Heck S. [5], Dangelico RM [6], Schiederig T. [7], Albino V. [8] et al. They analyze the impact of material flows on the production competitiveness and the environment, provide a definition of "green" innovations and "green" products, study the issues of training employees on the problems of reducing energy consumption, emissions and solid waste; prove that technological advances contribute to the growth of resource productivity and, thus, help industrial producers not only cope with the growing shortage of material resources but also provide an industrial revolution. More fundamental attention to the issue of green innovation is focused by fundamental science [7], in particular in the impact of various strategies on the production of green innovative products [8, 9]. The growing number of researches examines the organizational aspects of such innovations, including the impact of product design, reuse, and recycling upon the production efficiency [10], forecasting waste disposal costs at the end of the product lifecycle, determining the proportion of products that can be recovered, repaired, or recycled [11], and so forth.

The aim of the article is to analyze the efficiency of business processes based on the principles of circular economy, considering their contribution to global sustainable development.

The main part

The circular economy is a common name for activities targeted at energy saving, regenerative environmentally friendly production and the consumption.

Unlike the traditional model of economic development, the circular model is the most successful way of preserving resources and materials, and hence that is the path to continued economic growth. The impetus for a complete reuse and recycling of all materials into the main goal for the rest of the world is the climate change and natural resources depletion.

In order to become circular, the economy definitely needs much more than just the total disposal of all waste (see fig. 1). Our world is expecting radical changes: from raw materials selection, product development and new service concepts to the widespread use of by-products of one production as a complete raw material for another one.

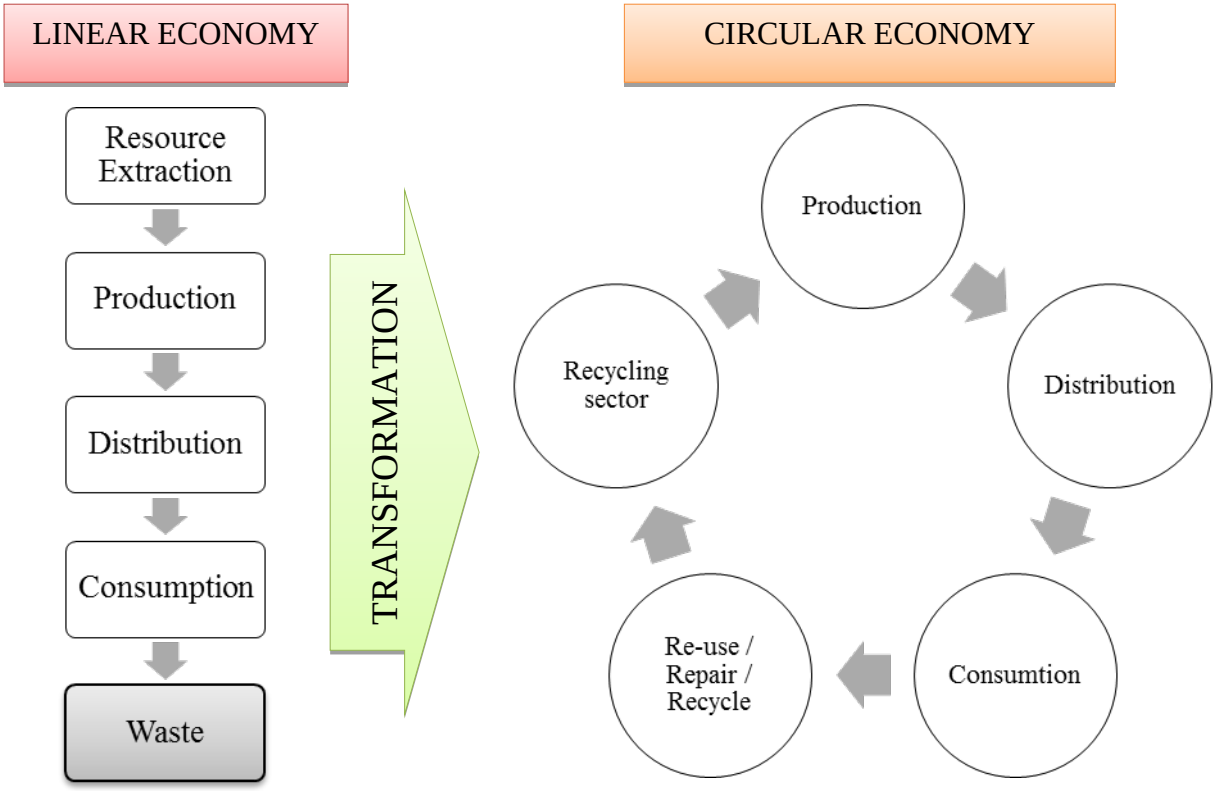

Fig. 1. Transformation of the linear economy into the circular economy
Source: Own elaboration

Additionally to the main changes in the consciousness of both a manufacturer and a consumer, it is equally essential for the circular economy to establish close cooperation among production, researchers and the authorities.

The researches intend to create new business models and product samples, which will take into account the need for easy maintenance, reuse and further processing from the very start.

Nicola Kim, the Philips Lighting [13] head of social responsibility and control of this transition, says that there are three key conditions for ensuring the change within the company towards the circular economy: - there needed a business model to change the way of thinking about capital expenditures or large one-time investments that have final destination - to the operational costs or large investments of time or money; which the main purpose is to stay in operating activities as long as possible. Secondly, the circular design is important in all operations, from product development, production processes, and marketing plans, around the goal of using materials over and over again. This involves planning the most complex component, the reverse logistics or "how to get things back". Thirdly, the cooperation. "In order to change processes in circular models, one must work with all both suppliers, and customers".

Over the past decade, the European Union has enacted widespread legislation on waste control. This has led to a sharp reduction in air, water and soil pollution in the EU while raising economic growth and creating jobs in waste collection and recycling.

An alternative is the development of the "green economy" principles. Studies by German scientists [14] show that the "green economy" will have a short-term, medium-term and long-term impact on the employment.

Short-term effect: policies aimed at preserving the environment will increase the price of pollution and use of resources. This will lead to a reduction in resource-intensive industries and dismissal of their employees. However, this negative impact will be compensated by an increase in production in alternative environmental sectors, and in personnel retraining.

Medium-term impact on employment occurs after personnel retraining. New industries and markets for green products and services will be developed. The export of these goods and services will revive as a result of the global market development for the "green" products and services. Employment will become stable. However, prices for energy, emissions of pollutants shall increase.

The long-term impact on employment occurs as a result of innovation-technological and inter-sectoral structural changes. Labor productivity increases along with overall welfare. Thus, in the long run, the link between the "green economy" and people's welfare is observed.

The circular economy technologies and initiatives have had growing interest from environmental managers and sustainability officers of the past. A new report suggests the implementation of the innovations that either reduce waste or convert waste to new valuable products also add investors to the fans' list.

Waste collection and processing are the largest contributors to investment amount and deals of material recycling. According to the Lux Research [12], the circular economy technologies received $668 million in funding from 2011 through the first quarter of 2016. Where 69 percent share of this total investment was made by material recycling and accounted for 65 percent share of the total 155 deals (see tab.1 below).

Table 1. Largest contributors to investment amount and deals of material recycling

Contributors	Investment amount to material recycling by value chain		Investment deals to material recycling by value chain	
	The amount, million $	Share, %	Number	Share, %
Collection	196,16	36%	40	36%
Processing	260,56	48%	47	42%
Sorting	34,94	6%	11	10%
End products	53,36	10%	13	12%
Total	545,02	100%	111	100%

Source: Compiled by the authors on the materials [12]

Recycling has not yet realized its full potential to serve the world in an innovative, environmental, and economic way.

Waste collection and sorting are experiencing disruptive changes due to innovations based on software, data analytics, and robotics.

General Motors in its latest sustainability report said it has generated $1 billion in new revenue streams from recycling and reuse. The company sells vehicle parts with slight blemishes on a secondary market to dealerships, rather than throwing them in the trash [12].

GM also turns employees' recycled water bottles into noise-reducing fabric insulation that covers the Chevrolet Equinox engine — thus saving money on purchasing virgin materials — and turns polystyrene foam packaging into footwear [12].

Circular economy principles could save for the construction industry a trillion dollars while cutting its carbon emissions and waste, according to the World Economic Forum report published in May. These savings come from reusing materials — discarded asphalt products can be used as road-building materials and waste lumber as a wooden flooring material, for example — and reduced waste hauling costs. Plus, recycled products generally cost less than virgin materials.

Another report published the same month found medical waste costs of each operating room about $5,243 per year and reprocessing this waste could save one health care company about $25,000 on medical devices, representing 22 percent of its annual spending.

Trucost found circular economy approaches to plastics such as closed-loop recycling deliver $3.5 billion in environmental savings.

China is making serious efforts to implement the circular economy to ensure long-term and sustainable solutions to fight the acute shortage of resources and environmental degradation. Policy implementation is carried out at micro-, meso- and macro-levels, covering production, consumption and waste control. The concept of the circular economy describes energy, water, various by-products, and knowledge. Industrial symbiosis is an expanded concept where the benefits are derived from integrated economic and environmental aspects. These are aspects of joint competitiveness promotion through efficient resource allocation and productivity improvement. The restructuring of industrial structures both contributes to the reduction of negative external factors and helps to improve social welfare as well. We see the transition from a linear to a circular economy as a necessary condition for a stable world. The circular economy seeks to separate economic growth from natural resources and ecosystems through more efficient use of these resources.

By definition, it serves as a driving force for innovation in resource, component and multiple uses of waste, which is equivalent to new business models, in particular in the area of services provided. The idea of a circular economy is a concept: a more efficient use of a resource allows creating a higher value of a new product at the expense of cost savings, the

development of new markets or the growth of existing ones. The main prerequisites for the circular economy as a necessary business model are:

— resources and their pricing. The world is at the final stage of using cheap oil and raw materials. The lack of fossil fuels and the limited availability of all types of natural resources, along with increased consumer demand, are reflected in the waste control problem. Just to use less for today is not enough and irrelevant. Accordingly, increased volatility in resource prices constrains economic growth by preventing businesses from using risk-based resources;
— the increase of the consumers of the middle class. The world has gone through two stages of a massive expansion of the middle class since 1800 and is now at the third stage. Only in Asia, 525 million people can call themselves middle-class representatives, which is more than the total population of the European Union. Over the next two decades, it is anticipated that the middle class will expand to 3 billion people, mainly through emerging countries;
— "big data". The advent of the "big data" concept has shifted the order and scale of which the problems can be solved, providing a deeper knowledge of the market and optimization of consumer-oriented solutions. This concept proposes a solution to the problem of determining what and where it is in the economy, what is made from and what state it is in, which makes the circular production more efficient than subtractive production;
— legislative changes and management globalization. More and more companies are responding to various challenges, including new regulatory models and management globalization through the introduction of new innovative projects for their products. It is especially seen in those cases that were previously considered as problematic: e.g., toxicity in various materials or dumps, a huge amount of waste, which then turns into globalized circular chains of value-added creation;
— transition from "agreement" to "relations". The multinetwork world of today reflects new levels of interaction and communication with consumers and brands that go far beyond traditional transactions. Online interaction via Facebook, Twitter, YouTube, and other websites is a growing global phenomenon, which paves the way for the relationship between clients and companies, particularly through circular chains.

It should be added that the implementation of the global value-added circular chains, taking into account global supply chains of secondary raw materials, should be based on the three key drivers for the successful creation of such initiatives:

1. Circular efficiency. Mastering all elements of the value-added chain from start to finish creating an effective control system for reducing carbon dioxide and other waste emissions. Initiatives that cannot be achieved exclusively by a single company can become very attractive when delivered within the circular chain.
2. Finding the right partners in engaging in the global circular initiative of value-added chains creation requires the outside circle search of well-known companies. The challenge is to find the ideas that are most suitable for solving the specific problem of the added value chain and to build it with a better ability to realize these ideas. The construction of successful chains requires a good understanding of the value sources, - social, economic and environmental - for all stakeholders and ensuring that they are distributed on a fair and equitable basis.
3. The scale of the circular initiative. It requires time and resources from all partners, as well as a thorough monitoring of performance to maximize the effect. In order to identify the mitigation potential, all production stages must be considered, from the early stages of the design to the use. Often, the stage where the impact of carbon or other emissions is the greatest is becoming a crucial stage in the circular chain with the potential for joint work on reducing CO2 emissions.

Over the past decades, production has shifted to Asia due to the resources availability and the advent of a significant segment of the middle class in the region with increased purchasing power, which gave a decisive boost to global trade in products, particularly in China. The circular economy should be considered as the entire process, from the point of view of the waste generated by the eventual conversion into secondary raw materials, replacing the virgin resources and providing equivalent functionality. Such circular initiatives on globalized waste control are often implemented in China or India. Global recycling products trade for further recycling is a prerequisite and reality for most recycled products: metals, paper, and plastics. For example, plastic in Europe: according to the International Solid Waste Association (ISWA) 2014, almost half of the exports of plastic products are made from household waste, which is recycled. The vast majority (87%) are exported to China. The same is typical for the US and Japan.

Conclusions

Thus, the circular economy of plastic products in Europe and the US is largely materialized through international transportation, reusing, remanufacturing of plastics and products' manufacturing in China. In this regard, a number of issues arise concerning the environmental effects of such circularity. The fundamental issue is the environmental and professionalism of the conditions under which the products are processed. Accordingly, the Chinese government is trying to reduce its dependence on unregulated, small-scale low-tech processing operations and work without polluting the environment, which is a prerequisite for such large-scale research by the Chinese scientist in the circular economy.

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