

Chapter 1

CIRCULAR ECONOMY IN THE EUROPEAN CONTEXT

1.1 DEFINITION AND SHORT HISTORY OF CIRCULAR ECONOMY CONCEPT

The concept of Circular Economy (CE) aims to replace the old paradigm of the traditional linear or open-ended economic model in which goods are manufactured from raw materials, sold, used, and then incinerated or discarded as waste. The old model has generated economic losses and has caused the degradation of natural ecosystems. The process of transforming the linear model into a circular one involves reconsidering unsustainable aspects in order to identify future development opportunities.

The specific notions of CE such as the shortage and perishable nature of resources, the preservation of the environment etc. have been introduced and developed by economic science over the last 250 years.

The circular economy's roots go back to the eighteenth century. In 1798, Thomas Malthus published his work named "An Essay on the Principle of Population." In this work, he argued that continued population increases would diminish the world's ability to feed itself. Other personalities who write about responsible use of natural resources, in this period, are John Stuart Mill, Hans Carl von Carlowitz, John Law, Richard Cantillon etc. (Lacy, 2015).

The introduction of the concept of CE in the economic literature cannot be attributed to a single author but rather to several schools of thought, which includes Industrial Ecology.

Industrial Ecology (IE) is a study aimed at understanding the circulation of materials and energy flows; therefore, IE must first understand how the industrial ecosystem works, how it is regulated and its interactions with the biosphere in order to determine how the industrial ecosystem can be restructured to resemble how natural ecosystems function (Erkman, 1997).

S. Erkman defines four key principles of the IE (Erkman, 2001):

- waste and by-products must systematically be valorised;
- loss caused by dispersion must be minimized;
- the economy must be dematerialized;
- energy must rely less on fossil hydrocarbon.

IE proposes the transition from open to closed cycles of materials and energy thus leading to less wasteful industrial processes. More recent theories such as performance economy, cradle to cradle, biomimicry and blue economy have contributed to further refine and develop the concept of CE.

Walter R. Stahel is recognised as one of the most important thinkers of the circular economy and the founding father of the performance economy. He has proposed a shift from traditional economy to what he calls the Functional Service Economy (Stahel, 2010). The switch towards a functional economy implies change in the whole organization of a company, in the whole strategy of the company and in its business model. A functional economy optimizes the use (function) of goods and services while consuming as few material resources and energy as possible. This functional economy is considered more sustainable than the traditional economy.

The functional service economy isn't limited to the tertiary economy. This type of economy is also applicable for the primary and secondary economy. The functional economy must be linked to the performance economy which has proposed three major objectives (Stahel, 2010): higher growth (wealth up), more jobs (jobs up) and lower resource consumption (resource consumption down), as can be seen in the figure 1.1.

In the last period, new theories such as Performance Economy, Cradle to Cradle, Biomimicry and Blue Economy have contributed to develop the concept of CE.

The Performance economy moves the economy towards sustainability and shifts economic thinking from „doing things right” to „doing the right things” (Stahel, 2010).

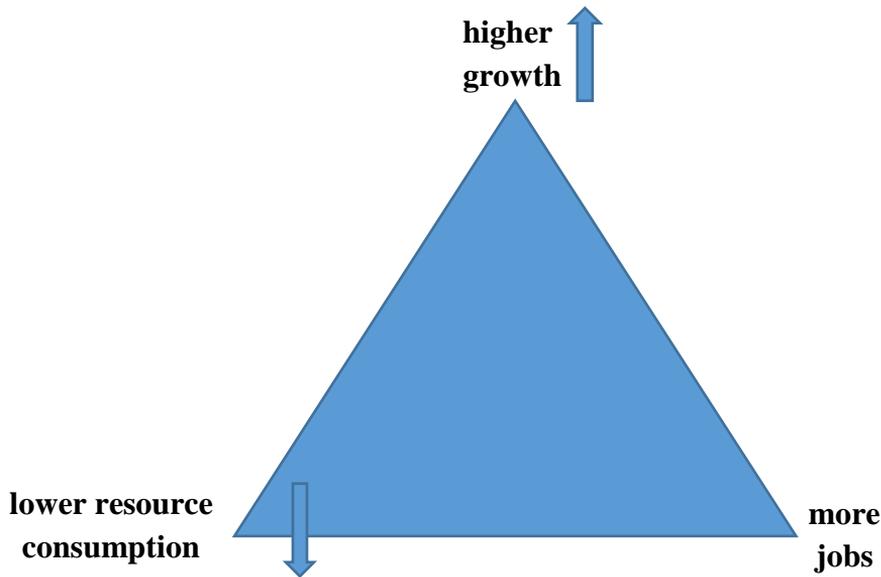


Fig.1.1 The objectives of the performance economy (Stahel, 2010)

The Cradle to Cradle concept was developed by German chemist Michael Braungart together with American architect and economist Bill McDonough. Cradle to Cradle can be defined as the design and production of goods in such manner that at the end of their life, they can be recycled.

The Cradle to Cradle concept is based on three main principles:

- waste equals food (eliminate the concept of waste);
- use renewable energies;
- supporting (celebrate) diversity.

The term of Biomimicry has introduced by Janine Benyus in 1997 in her book named "Biomimicry: Innovation inspired by nature". Biomimicry means to imitate life. In the nature there is no waste so materials and energy circulate in the nature, without creating pollution. Biomimicry is an approach that tries to implement sustainable innovation in design, business, engineering etc by applying successful strategies found in nature.

The Biomimicry theory is based on three main principles (Mcgregor, 2013):

- nature as model (nature can provide models and solutions in order to solve human problems);

- nature as measure (nature can be viewed as a standard to judge the sustainability of our innovation);
- nature as mentor (nature can be viewed as a source of knowledge for our innovation).

In 2004, the Belgian businessman Gunter Pauli has introduced the Blue Economy concept based on the ZERI (Zero Emissions Research and Initiatives) philosophy. The concept of the Blue Economy means the use of seas and coasts for economic activities. The main principles of the Blue Economy are the innovative business model and competitiveness.

These new theories and CE have a big common point of view: the traditional linear economic system is not sustainable and it must be replaced by a new system that is much more environmentally friendly. The following figure shows schematically the paradigm shift proposed by the CE, from linear economy into circular economy:

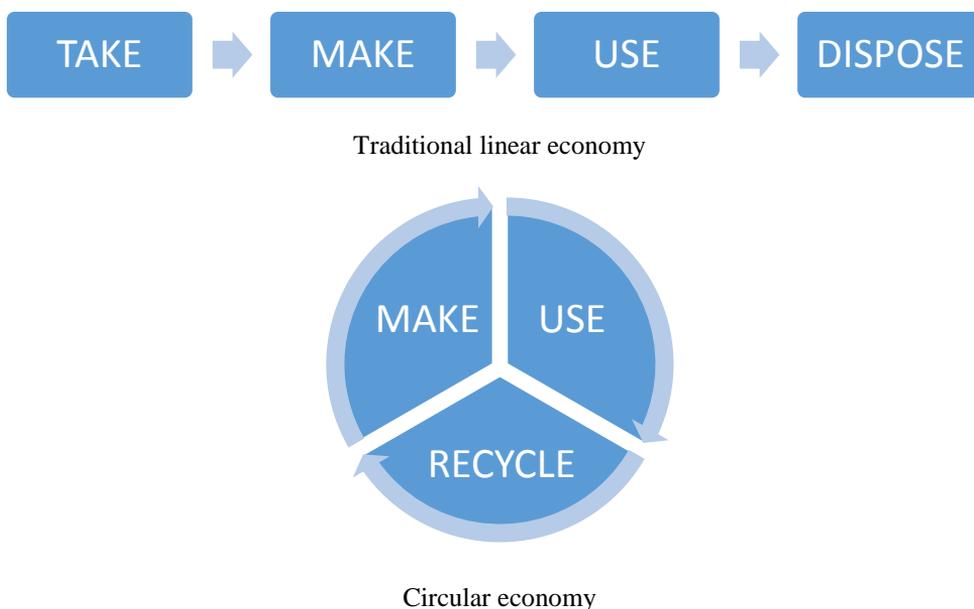


Fig.1.2 Traditional linear economy system vs Circular economy (Instarmac, 2020)

The CE concept has not evolved uniformly but has developed differently depending on the cultural, social and political systems where it has been implemented.

For example, in Germany, the CE concept was introduced into environmental policy in the early 1990s to try to solve the problems associated

with raw materials and the use of natural resources. In the UK, Denmark, Switzerland and Portugal, the CE concept is used especially for waste management.

China is another country which has implemented and developed the CE concept. In China, the EC concept is used for the new product and technologies development and for the improvement of industry management. More than that, China has integrated CE in its national strategy.

The C.E. is an important part of the EU policy on sustainable development. For the European Commission, CE is an economic model in which the value of products and materials is maintained for as long as possible. The European Commission has proposed in 2020, a new Circular Economy Action Plan for a cleaner and more competitive Europe in order to accelerate the transition towards this new regenerative economic model (European Commission, 2020).

1.2 CIRCULAR ECONOMY PRINCIPLES

The concept of circular economy is based on several principles. These principles were taken from the theories that fundament the circular economy. The list of these principles is longer or shorter depending on the authors who have proposed the introduction of basic principles on which the circular economy is based.

For example, the Ellen MacArthur Foundation considerate that the circular economy concept is based on three very important principles (Coste-Maniere, 2019):

- design out waste and pollution;
- keep product and materials in use;
- regenerate natural systems.

The Weetman approach's about circular economy are related on four principles of the circular economy (Weetman, 2016):

- waste equals food;
- build resilience through diversity;
- use renewable energy;

- think in systems.

British Standards Institution states six principles of the circular economy (The British Standards Institution, 2017):

- systems thinking (“organisations adopt a holistic approach to understand how individual decisions and activities interact within the wider system they are part of.”);

- innovation (“organisations continually innovate to create value by enabling the sustainable management of resources through the design of processes, products/services and business models.”);

- stewardship (“organisations manage the direct and indirect impact of their decisions and activities within the wider system they are part of.”);

- collaboration (“organisations collaborate internally and externally through formal and/or informal arrangements to create mutual value.”);

- value optimization (“organisations maintain all products, components and materials at their highest value and utility at all times.”);

- transparency (“organisations are open about decisions and activities that affect their capacity for transition towards a more circular and sustainable mode of operation and are willing to communicate these in a clear, accurate, timely, honest and complete manner.”).

Despite the diversity among this principle sets, all of them highlight the importance to implement the CE concepts into the companies in order to achieve a sustainable development.

1.3 AREAS OF APPLICATIONS

Areas of applications of the CE are very large. The circular economy has begun to be applied in several countries and in different sectors.

The EU is the leader on the way to a circular economy at the global level. In the EU, the C.E. is applied in the chemical industry, building sector, packaging sector, forest sector, textile industry, food industry, automobile industry, plastics industry, mining and metals industry, furniture sector, defence industry etc.

In China the C.E. concept was “imported” from Germany and Japan. This concept has been adopted very fast by the Chinese Government and has

treated as an important part of national scientific development strategy. According to national scientific development strategy the circular economy concept has been implemented in some Chinese companies from industrial sectors ranging from steel and iron, metal manufacturing, coal excavation and processing, to power generation, chemicals, construction materials and light industries (Geng, 2008).

1.4 EU ACTION PLAN FOR THE CIRCULAR ECONOMY

In 2015, the European Commission has adopted “First Circular Economy Action Plan”, which includes measures that will stimulate Europe's transition towards a circular economy. The measures included in this action plan try to contribute to “closing the loop” of product lifecycles through greater recycling and re-use (European Commission, 2015).

The plan includes concrete actions to be taken in areas such as plastics, food waste, construction, critical raw materials, industrial and mining waste, consumption and public procurement. The proposed actions support the circular economy at every stage of the value chain, from production to consumption, repair and remanufacturing, waste management, etc.

In 2018, the European Commission and the Council of the European Union have adopted new directives on waste. According to these directives, the member states of the UE should take measures to promote prevention and reduction of food waste in line with the 2030 Agenda for Sustainable Development, adopted by the United Nations General Assembly in 2015. Those measures try to reduce food waste in primary production, in processing and manufacturing, in retail and other distribution of food, in restaurants and food services as well as in households (EU target for recycling is 75% of packaging waste and 65% of municipal waste by 2030).

In 2018, the European Commission has adopted other initiatives in the field of the Circular Economy Action Plan: a proposal for a Directive on the reduction of the impact of certain plastic products on the environment and a proposal for a Regulation on minimum requirements for water reuse.

In 2020, the European Commission has proposed and adopted “A new Circular Economy Action Plan for a cleaner and more competitive Europe”.

This plan has an ambitious goal: to achieving climate neutrality by 2050 and decoupling economic growth from resource use. Among the measures proposed in this plan we can mention the following (European Commission, 2020):

- designing sustainable products;
 - reducing (over)packaging, packaging waste and another types of waste (food waste, textile waste);
 - high-quality sorting and removing contaminants from waste;
 - using of biodegradable plastics and of bio-based plastics;
 - water reuse including in industrial processes.
 - creating a well-functioning EU market for secondary raw materials
- etc.

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