

THE PLANNING MODEL OF THE EUROPEAN UNION: CIRCULAR ECONOMY STRATEGY

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Abstract: *It is not news that natural resources are limited and humanity, but especially companies, are called to implement strategies to reduce waste and protect the environment. At the level of the European Union, these aspects are treated with maximum responsibility. In this highly complex context, the paper is aiming to analyse the main levers and strategies for the massive transition to the circular economy. The paper starts with the literature review exemplifying a few concepts about circular economy, Then, the main legal and institutional framework of the European Union, such as, regulatory framework of the European Union and the circular transformation in the European panorama are briefly presented. Furthermore, in the chapter entitled Innovation and circular economy, the concept of innovation, the circular economy concepts and the emergence of the circular economy in contrast to the linear economy are approached. Finally, the paper presents a brief analysis of circular economy objectives and strategies at the European level, including the main strategic objectives of the new circular economy plan and some difficulties and possible solutions related to the transition of companies towards circular economy.*

Keywords: *circular economy, innovation, strategy, planning model, institutional framework*

JEL Classification: *Q59, O36, O21, L 19, D02*

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1. Introduction

At a time when climate change is showing its destructive force, with record temperatures and ecological catastrophes, it is necessary to look for an alternative approach to the current one that allows us to optimize processes rather than products, paying particular attention to the management of material flows.

In this case, the importance of the biological cycle (Biosphere) alongside the technological cycle (Technosphere) must be taken into account, thinking of both as material flows characterized by regenerative processes that must not come into contact to avoid contamination. In this area, institutional initiatives such as those carried out by the European Commission are key to building a more sustainable future by 2050.

In fact, the increasing importance that Europe attaches to the transition to a circular model implies the great boost that this type of economy could give to the fight against the current climate crisis.

The argument analysed in this paper is that of the economic model in the European Union, starting from the EU regulatory framework, the institutional framework, taking into account today's climate events, the transition from linear economy to circular economy as an engine for developing a new wave of innovation, achieving the Sustainable Development Goals proposed by the 2030 Agenda and reaching the New Action Plan for Systems of Circular Economy.

The proposed research is of fundamental (basic) type, as it aims to acquire new knowledge in the sphere of economy at European level and uses as methodology, qualitative research so that the paper will answer questions on the importance of optimizing processes, the importance of biological cycle, technological cycle, innovation, the need to use a new circular economic model.

2. Literature review

Scientifically, the idea of circularity was proposed in 1848 by Hofman, president of the Royal Society of Chemistry, who stated that there is no waste in a chemical industry, only products (Murray et al., 2015).

To introduce the concept to the economic field, it is necessary to make a great leap forward in time, reaching 1966, the year when Kenneth Boulding, in his article "The Economics of the Coming Spaceship Earth", suggests that humans should find their place in a cyclical ecological system. Boulding sees in economics the ability to make human life sustainable, which must wisely use the resources now scarce available and regenerate materials whose availability is coming to an end.

There are numerous references from the recent past attesting to the idea of a "closed circle", also pointed out by Barry Commoner, in his book "The Closing Circle" (1971), defines the thesis that what is taken from Earth is returned to it at the end of a more or less long cycle, according to the first law of thermodynamics, according to which energy is neither created nor destroyed, but transformed.

Subsequently, Walter R. Stahel (1976) elaborates a report describing a circular economic system between science and economics, capable of generating resource savings, efficient waste management, creation of new jobs and economic competitiveness. In 1981 he published "Jobs for Tomorrow: The Potential for Substituting Manpower for Energy" in which he validated the possibility of creating a stable value chain through an emphasis on the relationship with the consumer.

Pearce and Turner, in "Economics of Natural Resources and the Environment" (1991), taking up the principles mentioned above: they describe a system between economics and environment, analysing it in terms of the principles of thermodynamics that dictate substance and energy degradation.

A milestone in this area is the book "Cradle to Cradle: Remaking the Way We Make Things" (2002) by William McDonough and Michael Braungart, which contrasts with the current system of industrial

production, based on the “Cradle to Grave” paradigm and provides for the reintroduction of production waste as raw materials for new products. The same authors, after their first publication, deepened the concept behind this new system, analysing the objective of modern strategies then defined as “eco-efficiency”, according to which it was necessary to reduce the environmental impact on business, and noted that such strategies, which certainly implied improved operations and a lower environmental impact in the short term, were not sufficient to achieve sustainable objectives on long term.

Ellen MacArthur Foundation (in Circular economy introduction) defines the circular economy as “A generic term to define an economy designed to regenerate itself”. The circular economy is a production and consumption model based on reducing, reusing, repairing and recycling existing materials, ensuring that their life cycle is as long as possible.

3. Legal and institutional framework of the European Union

3.1. Regulatory framework

The European Union as we know it today is the result of the succession and progressive evolution of the international treaties stipulated between the various Member States and their relative application: starting with the Treaty of Brussels, signed on 17 March 1948. Treaty was establishing the Western European Union or WEU, an international regional organisation for military security and political cooperation, the terms of which were amended on 23 October 1954. The Union was dissolved in 2011, creating the European Union (EU).

The current EU represents the evolution of the European Economic Community (EEC), born on 25 March 1957 by the Treaty of Rome, with the aim of increasing Economic Cooperation between the great powers of the Old Continent (European Commission, 2012). EEC members were only Belgium, France, Germany, Italy, Luxembourg and the Netherlands. With the Treaty of Rome, Euratom was established to

coordinate research into nuclear energy and to ensure ethical and peaceful use. With the accession of new states and the signing of various treaties, the European Union assumed its current structure.

These, over time, laid the foundations for the creation of a globally established economic-legal-institutional system, capable not only of playing a fundamental strategic role in the international chessboard, which in recent years has seen the US and China compete for world leadership in all areas, but also of facing unfavourable short-term cyclical fluctuations and various economic crises. To this end, it is necessary to frame the institutional and regulatory context in which economic and monetary policy choices have been made and to identify the main actors.

The euro area is the subset of countries in the European Union that have also adopted a common currency and is one of the most important currency areas in the world. In order to ensure the smooth functioning of monetary and fiscal policy, the European Central Bank was established and the Stability and Growth Pact was signed.

The euro is certainly, as Robert Schuman (1950), considered as the architect of European integration project, recommended, “one of those concrete achievements which, first of all, creates de facto solidarity and strengthens the construction of Europe; starting from the six founding countries, over the years, through an ambitious project and good macroeconomic functioning, the member countries have become twenty-seven”.

3.2. Institutional framework of the European Union

With the signing of the Treaty of Lisbon on 13 December 2007, it brings to an end a long reform process that began in the 90s, characterised by a series of treaty revisions which, however, did not provide satisfactory answers to institutional issues of fundamental importance. A division of roles and competences of European “political” institutions is defined and a structured model has been created with four institutions involved in decision-making: the European Parliament, the European

Commission, the Council of the European Union and the European Council.

The role and functions of the European Parliament are laid down in Article 14 TEU. Together with the Council, it exercises legislative and budgetary functions, political control and advisory functions, and elects the President of the European Commission. The European Commission, as defined in Article 17 TEU, exercises its responsibilities with complete independence, which is a fundamental feature of the project as far as the High Authority is concerned.

The work of the institutions is complemented by other institutions and bodies, including: the Court of Justice of the European Union (Luxembourg), the European Central Bank (Frankfurt), the European Court of Auditors (Luxembourg).

But what does mean *European governance*? In order to be able to explain the term European governance, it is necessary to make an analysis of European Economic Governance because in the last decade the issue of the European Economy has been at the heart of the European political debate.

The economic governance refers to the system of institutions and procedures established to achieve the objectives of the European Union in the economic field, namely the coordination of economic policies aimed at promoting the economic and social progress of the EU for the benefit of its citizens. The financial, economic and fiscal crisis that began in 2008 highlighted the need for the EU to have a more effective economic governance model than the economic and fiscal coordination used up to that point. Developments in economic governance include strengthening the coordination and surveillance of fiscal and macroeconomic policies, and establishing a framework for financial crisis management.

The Treaty of Maastricht introduced a clear distinction in the *economic governance* of the European Union: on the one hand, the internal market (which guarantees the free movement of goods, services, capital and

people and within which European citizens can live, work, study or do business freely) and, on the other, economic and monetary union.

4. Framing the circular transformation in the European panorama. Innovation and circular economy

4.1 The concept of innovation

The term innovation (from Latin *innovatio-onis*) derives from ancient times, man is a continuous innovator and arises from the need to always find new ideas to improve his life and the relationship he has with the surrounding world.

Starting from the industrial revolution in England in the second half of the eighteenth century, which transformed the industrial organization and methods of the time, leading to the transition from economies of scale to those of the factory, with numerous innovations in tools, machines and industrial processes.

The first, however, to approach the theme of innovation in a broad and in-depth way is Joseph A. Schumpeter (1961), an economist who made a great contribution to literature; who said that capitalism develops in a succession of cycles, with expansions and recessions, determined by: technology (technological paradigms), capital accumulation (investment and profits), finance (invested resources, sources, relationships with companies). All this fuels the cyclical nature of development.

It is appropriate to clarify the significance of invention and innovation, the first one refers to the first conception of a new product or process, and the second one refers to the implementation of a new idea for the first time (Fagerberg, undated). It is worth emphasizing, that invention and innovation are related, but inventions do not always turn into innovations and innovations are not always based on inventions.

In the entire complexity of innovation, the essence is the innovation of new products because products are what create value for customers and for companies (Negulescu, 2020). The foundations for new product and

service innovation can be revolutionary and result from major new technologies, such as a self-adhesive hanger or bringing bright colours to previously monochromatic items. Innovations can also involve something that has long been used or enjoyed in a market, such as a food or face cream, and introducing it to a market that has never seen it (Doval, 2023).

4.2. The circular economy concepts

“Waste becomes a resource” and enables innovative growth paths that, through new business models, make it possible to efficiently optimize all individual phases of production processes, minimizing waste resulting from each activity (Ellen MacArthur Foundation).

Geissdoerfer et al. (2020) takes into consideration the product’s life cycle to illustrate the concept of circular economy in different phases, when strategies of circular economy, such as reuse, remanufacturing, refurbishing or recycling may intervene (fig.1).

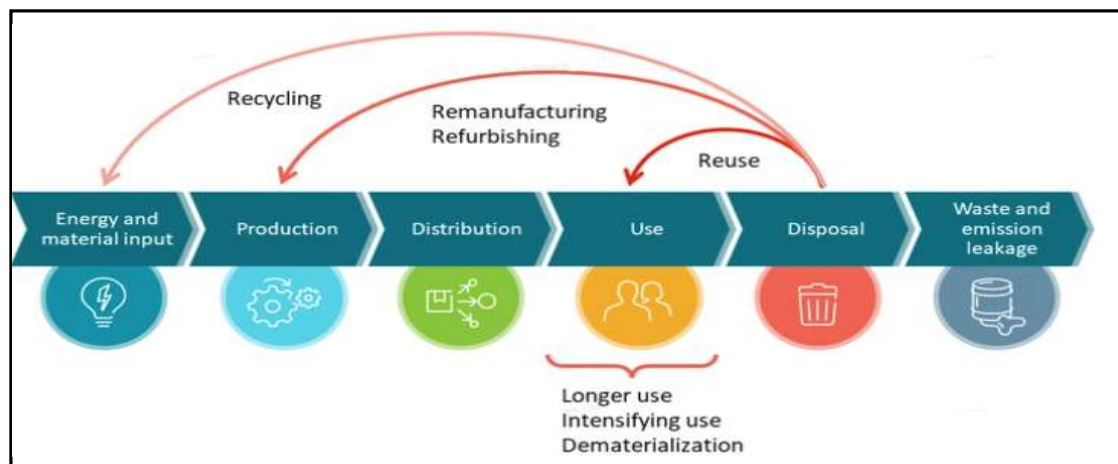


Fig. 1. Illustration of the concept of circular economy

Source: Geissdoerfer et al., 2020

In this regard, it is necessary to develop a global system that includes both economic and ecological paradigms: the environment becomes the compartment in which the economy moves, and which therefore relates

to it through circular links that take into account physical, biological and climatic limits.

The aim is to limit the consumption of raw materials and non-renewable energy, minimising harmful input and output flows and continuing to aim to create new economic, environmental and social values.

The human being has his destiny in his own hands and his future depends on what he does and what will do. Each individual is born free, as is Nature that surrounds him, but unlike it, which regulates itself so that it can regenerate itself in relation to each individual ecosystem, man is always looking for a way to change the rules that can limit his autonomy. Human freedom has disfigured and diminished that of nature: the circular economy must therefore become a philosophy of life, enabling all actors in the field to resume their natural cycle.

The utopian objective is to create an economic model so effective as to completely reduce waste (zero waste), thus generating a system that does not require reintegration or external help to continue over time.

Circularity is based on design thinking; therefore, it is necessary to think creatively. Design thinking is associated with prescriptions for the innovation of products and services within business and social contexts (Brown, 2008; Dorst, 2012). Through growth paths based on sharing and collaboration, it is possible to guarantee consumers advantages in terms of price, quality of goods and services and, at the same time, to create relationships based on solid reputation and trust mechanisms.

4.3. The emergence of the circular economy in contrast to the linear economy

The circular economy was clearly born in contrast to the classical linear vision, which can be summed up in "take, make, use and dispose". The traditional circular economy model is based on the three "R's": reduce, reuse, recycle. The linear economy is a system that the world has inherited since the Industrial Revolution, but in practice it is possible to

see its acceleration only from the nineteenth century, when fossil carbon was discovered that could be used as fuel.

Over time, financial systems and the large surplus of nature reserves allowed industrial growth, but the beginning of the third millennium marked the birth of society's awareness of the difficulties in continuing development at such a pace: difficulties caused by distrust of governments and institutions, as well as a shift in the financial paradigm based on credit and an emphasis on environmental degradation.

The linear hypothesis involves withdrawing resources, reprocessing them through production processes, providing tradable goods and services to meet demand, which, once their utility has been transferred, become waste to be thrown away. In fact, the choice of linearity implies a particular propensity for the production phase rather than for consumption and the well-being of individuals, and this is also one of the reasons why society continues to consider GDP, excluding critical assessments for human, social and natural capital.

Linearity introduces the concept of planned obsolescence: the trend is to focus on short-lived products to encourage the consumer to make new purchases. The meaning is to make an obsolete product in a short time and maintain an advantageous market price, to push customers to buy back the good rather than trying to fix it.

However, the linear economy continues to prevail in practice, as every change entails upfront costs and difficulties, and even then, the pursuit of circularity involves challenges dictated by building a new supply chain (Hayes, 2023) and a paradigm of thinking that may seem reversed: the circular economy must be implemented especially in the early stages of value chains, so as not to become a mere "recycling economy".

The circular economy, based on the definition given by the Ellen MacArthur Foundation (no data), is a radically rethought model compared to the classical production model that is based on maximum exploitation of natural resources and aims to maximize profit by reducing production costs. A circular approach aims to: review all stages of production.

This focus runs through three fundamental principles indicated by the Ellen MacArthur Foundation: conserving and increasing natural capital, controlling limited deposits, and balancing the flow of renewable resources; optimising resource efficiency through the circulation of products, components and materials of the highest value, at all times, in both biological and technical cycles; identifying and eliminating negative outsourcing that may discourage the effectiveness of the system.

From the point of view of the consumer, it has become popular, the so-called rule of seven Rs, these are the pillars of the circular economy in its seven stages: Recover, Redesign, Reduce, Reuse, Repair, Renovate, Recycle, Recover.

Along time, starting from the “3R’s”, different authors have added other “R” to define circular economy, such as, Xing et al. (2017) who consider a paradigm of circular economy composed by other 7 pillars: reduce, reuse, recycle, recover, rethink, and, resilient.

As a bigger picture, Malooly (2023) presents ten stages of resource use and waste management in a circular economy (fig.2).

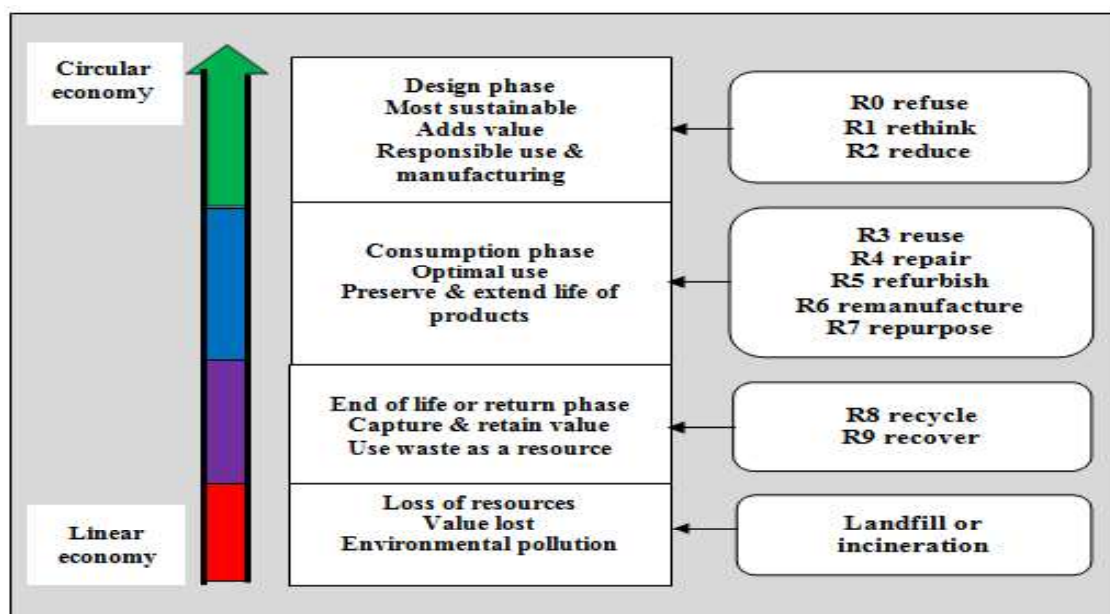


Fig. 2. The different stages that R-Strategies can be implemented

Source: inspired after Malooly, 2023

The ten strategies are classified under three categories that demonstrate the length of the waste loop each represents. The shorter the loop, the more sustainable the strategy is. The higher they are on the ladder, the tighter the waste loop. This means the strategy requires fewer materials and is therefore more circular. Smaller numbers also indicate the beginning of the value chain, and larger numbers at the end.

- Short loops focus on smarter product use and manufacture: R0 Refuse, R1 Rethink, R2 Reduce.
- Medium loops focus on life extension strategies: R3 Reuse, R4 Repair, R5 Refurbish, R6 Remanufacture, R7 Re-purpose
- Long loops focus on creative material application: R8 Recycle, R9 Recover.

On the other hand, Gladek (2019) states that in a circular economy, all materials should be used in such a way that they can be cycled indefinitely, just as they theoretically can in nature. The author underlines the „Seven Pillars” of the circular economy, as being: materials, energy, water, biodiversity, society and culture, health and wellbeing, and, value and explains:

- *Materials are cycled at continuous high value.* Material complexity is conserved by cascading materials in their most complex form for as long as possible. Materials are used only when necessary: there is an inherent preference for dematerialization of products and services.
- *All energy is based on renewable sources.* The materials required for energy generation and storage technologies are designed for recovery into the system.
- *Water resources are extracted and cycled sustainably.* Water is one of our most important shared resources: sufficient quantity and quality of water is essential to our economy and our survival.
- *Biodiversity is supported and enhanced through human activity.* As one of the core principles of acting within a circular economy is to preserve complexity, preserving biodiversity is a top priority.

- *Human society and culture are preserved.* As another form of complexity and diversity (and therefore resilience), human cultures and social cohesion are extremely important to maintain.
- *The health and wellbeing of humans and other species are structurally supported.* Toxic and hazardous substances are minimized and kept in highly controlled cycles, and should ultimately be eliminated entirely.
- *Human activities maximize generation of societal value.* Materials and energy are not currently available in infinite measure, so their use should meaningfully contribute to the creation of societal value. Forms of value beyond financial include: aesthetic, emotional, ecological, etc.

5. Analysis of circular economy objectives and strategies at European level

5.1. From the European Green Deal to the New Circular Economy Plan

Europe, for many years, is active on several sustainability fronts and with the objective of becoming the first climate-neutral continent by 2050, so the European Green Deal was presented to the European Commission on 11 December 2019 (Strategy and policy, EC).

A strategy consisting of a series of political and financial initiatives with the aim of improving the well-being of future generations, doing good for people, the planet and the economy. We have only one planet Earth at our disposal, but we consume resources as if we had many more at our disposal, so much so that at this rate, by 2050, we will consume as if we had three planets at our disposal, and it is estimated that the consumption of raw materials, fossil fuels and biomass will double in the next 40 years (un.org/sustainabledevelopment).

Current production systems (especially extraction and processing of raw materials) are responsible for more than 90% of biodiversity loss, reduced water availability and pollutant emissions dispersed into the environment (oecd.org/development/global-material-resources-outlook-

to-2060). In addition, without a transformation of the current economic system and with the current trend, it is estimated that the waste produced will increase by 70% by 2050 (Kaza et al, 2018).

The European Commission adopted the new circular economy action plan (CEAP) in March 2020 (Circular economy action plan, EC). It is one of the main building blocks of the European Green Deal, Europe's new agenda for sustainable growth. The EU's transition to a circular economy will reduce pressure on natural resources and will create sustainable growth and jobs. It is also a prerequisite to achieve the EU's 2050 climate neutrality target and to halt biodiversity loss. The new action plan announces initiatives along the entire life cycle of products. It targets how products are designed, promotes circular economy processes, encourages sustainable consumption, and aims to ensure that waste is prevented and the resources used are kept in the EU economy for as long as possible.

In 2023, the Commission revised the circular economy monitoring framework, previously adopted in 2018 (Special report 17/2023). The revision adds new indicators on:

- material footprint and resource productivity – to monitor material efficiency;
- consumption footprint – to monitor if EU consumption fits within planetary boundaries.

The new framework supports the EU's circular economy and climate neutrality ambitions under the European Green Deal (<https://environment.ec.europa.eu/>).

The Action Plan sets out seven key areas where the circular economy can be applied: plastics; textiles; electronic waste; food, water and nutrients; packaging; batteries and vehicles; buildings and construction (<eca.europa.eu/>).

5.2. Difficulties and possible solutions related to the transition of companies

In order to identify, monitor and manage the benefits and opportunities produced by this change, specific indicators are needed, which

businesses use. Another critical aspect is the complexity of legislation that leads companies to treat production waste as waste, rather than recover it, to reintroduce it into production cycles, to avoid penalties related to its reuse.

So far, materials coming out of circular processes are no cheaper than those coming out of linear processes and this does not encourage the market for this type of product.

Possible solutions to these problems could be as follows:

- Increasing economic and fiscal incentives to support these circular investments; defining a set of indicators to measure circularity;
- Cutting red tape and removing regulatory barriers preventing companies from becoming a circular key through a revision of existing rules (simple, efficient, fast);
- Creating a network of skills available to companies and partnerships in production chains to improve recovered materials and products by maximizing industrial symbiosis;
- Encouraging the market for 'circular' products, by-products/waste and by reducing costs compared to 'linear' production;
- Appropriate regulations and new standards on the origin of materials;
- Increasing citizens' awareness and participation through information, communication and national education.

Conclusions

Although the circular economy is now easy to describe in its theory, the real challenge to be implemented, so far, is a shared information system and support network capable of conveying choices to current economy actors to ensure a transition.

In order to make changes in a large territorial system, it is first necessary to start from a smaller scale, that is, from the products and materials used. Another way to stimulate the transition to a circular economic

system is through industrial symbiosis. Activating a network of companies would guarantee mutual support by strengthening the local market. Companies operating in this network gain an added value that allows them to survive over time thanks to the value chain created.

The need to update national rules is a key element to keep pace with action at European level. That is why it is important to review all rules on waste, waste recovery and End of Waste (EoW) to ensure proper recycling/recovery of materials.

In Europe, there are relevant case studies that have already successfully implemented policies and strategies for transitioning current processes to other circulars.

The shift to circular economy production cannot be separated from the innovation economy, understood at all levels: product, process and system. Therefore, only innovation can become the engine of transition to a new development environment, to closing cycles and efficient use of resources, but before innovating products and processes, a change of mentality is needed.

References

1. *A new Circular Economy Action Plan* for a cleaner and more competitive Europe, European Commission, Bruxelles, COM (2020) 98, <https://eur-lex.europa.eu/legal-content/RO/TXT/HTML/?uri=CELEX:52020DC0098>.
2. Boulding, K. E. (1966). The Economics of the Coming Spaceship Earth, In H. Jarrett (ed.) 1966. *Environmental Quality in a Growing Economy*, pp. 3-14. Baltimore, MD: Resources for the Future/Johns Hopkins University Press.
3. Braungart, M., McDonough, W. and Bollinger, A. (2006). Cradle-to-cradle design: Creating healthy emissions – a strategy for eco-effective product and system design, *Journal of Cleaner Production*, vol. 15, 13-14, pp. 1337–1348.

4. Brown, T. (2008). Design Thinking. *Harvard Business Review*, June 2008.
5. Circular economy action plan, https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en.
6. Circular economy introduction (undated). *Ellen MacArthur Foundation*, <https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>.
7. Commoner, B. (1971). *The Closing Circle*, Knopf, USA..
8. Dorst, K. (2012). *Frame Innovation: Create new thinking by design*. Cambridge, MA: MIT Press.
9. Doval, E. (2023). The role of innovation strategy in the enterprise life, *Review of General Management*, Volume 37, Issue 1, Year 2023, pp. 57-75.
10. Fagerberg, J. (undated). *Innovation*, <https://www.janfagerberg.org/innovation/>.
11. Geissdoerfer, M., Pieroni, M.P., Pigosso, D.C. and Soufani, K. (2020). Circular business models: A review, *Journal of Cleaner Production*, 277, 123741, doi:10.1016/j.jclepro.2020.123741.
12. Gladek, E. (2019). The Seven Pillars of the Circular Economy, *Metabolic*, https://www.metabolic.nl/news/the-seven-pillars-of-the-circular-economy/?gad_source.
13. Hayes, A. (2023). The Supply Chain: From Raw Materials to Order Fulfilment, <https://www.investopedia.com/terms/s/supplychain.asp#>.
14. Kaza, S; Yao, L., C., Bhada-Tata, P., Van Woerden, F. (2018). What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050, *Urban Development*, Washington, DC, World Bank.
15. Malooly, R. (2023). R-Strategies for a Circular Economy, *Circularise*, <https://www.circularise.com/blogs/r-strategies-for-a-circular-economy>.

16. McDonough, W., Braungart, M. (2002) *Cradle to Cradle: Remaking the Way We Make Things*,
17. 1st ed, Publisher: North Point Press, New York.
18. Murray, A., Skene, K., Haynes, K., (2015). The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context, <https://link.springer.com/article/10.1007/s10551-015-2693-2>.
19. Negulescu, O. (2020). Innovation management: the source of continuous improvement of competitive advantage and organization performance, *Review of General Management*, vol. 32, Issue 2, pp. 60-74.
20. Pearce, D.W., Turner, R.K. (1991). Economics of natural resources and the environment, *American Journal of Agricultural Economics*, 73(1), DOI:10.2307/1242904.
21. Schuman, R. (1950). in Robert Schuman: architect of the European integration project, https://european-union.europa.eu/principles-countries-history/history-eu/eu-pioneers/robert-schuman_en.
22. Schumpeter, J.A. (1961). The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle, translated from the German by Redvers Opie New York: OUP.
23. Special report 17/2023: Circular economy – Slow transition by member states despite EU action, <https://www.eca.europa.eu/en/publications/SR-2023-17>.
24. Stahel, W. R. (1976). The circular economy, *Nature*, 531, issue 7595.
25. Stahel, W.R., Reday-Mulvey, G. (1981). *Jobs for Tomorrow, the potential for substituting manpower for energy*, Vantage Press, New York, N.Y.
26. Strategy and policy, Planning, implementing and reporting, European Commission, https://commission.europa.eu/strategy-and-policy_en.
27. *Sustainable development goals*, United Nation, un.org/sustainable-development.
28. Xing, J., Silva, J., Duarte, I. (2017). *Interest, design and assessment of Eco-Industrial Parks in China within a circular economy paradigm*, Conference: IfM Cambridge 2017, University of Cambridge, <https://www.researchgate.net/>.