

THE ROLE OF DIGITALIZATION IN THE TRANSITION TOWARD CIRCULAR ECONOMY

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ABSTRACT: *The paper presents the ways in which the digitalization can contribute to an effective transition to a circular economy. Digitization can enable the intelligent use of limited resources, both on a human and material level. Therefore, we can say that digital society can influence the transition process and ensure the acceleration of the transition to a, circular economy.*

Keywords: *digitalization, digital economy, circular economy*

JEL Classification: O33, Q56.

1. INTRODUCTION

In recent years, the urgent need for digitization has been intensively discussed. In full era of the modern technologies', which penetrated more and more into almost all aspects of private, economic as well as political life, appeared the need to adapt to the new coordinates imposed by them. The modern technologies not only take over from people tasks that once were done manually and repetitively, but it can create completely automatic processes, which do not need the intervention of people.

Digitization can enable the intelligent use of limited resources, both on a human and material level. This could reduce the need for physical equipment, thus reducing the consumption of materials, energy and fuel. Last but not least, digital technology allows the use of generic computing and user interface hardware, which means a reduced need to produce dedicated devices [1]. Modern technologies can be used to improve services, to produce safer equipment and machines and, at the same time, it can improve production processes and bring competitive advantages to businesses, including in sectors that already enjoy significant positions, such as the circular economy, the car manufacturing industry, agriculture and tourism [2].

Digital transformation has the ability to influence the transformation of the economy from a linear to a circular economy. On the one hand, digital society has all the necessary technical means to ensure circular processes, and on the other hand, it creates a perspective of long-term sustainable development, which is significant for the development of a circular economy [3].

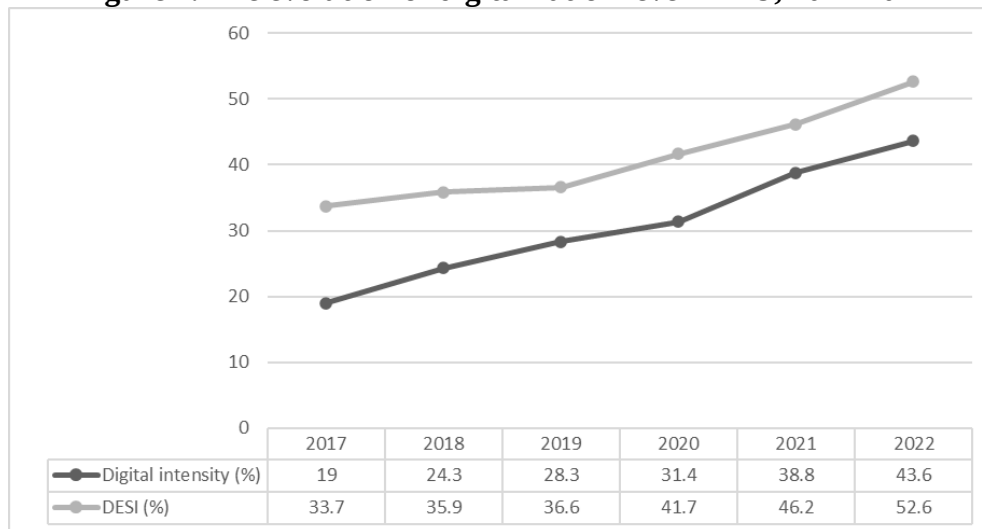
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2. DIGITALIZATION AND TRANSITION TOWARD TO CIRCULAR ECONOMY

Digitization involves using the possibilities offered by new technologies to rethink all aspects of operational processes. Some studies estimate that the digitization of products and services will generate for European businesses annual revenues of over 110 billion euros [4]. For many EU businesses, openness to digital transformation is essential if they want to remain competitive. According to a European Investment Bank study, digitization is associated with better business performance in terms of productivity, management practices, innovation, growth and well-paid jobs [5].

Digital transformation is one of the EU's priorities and consequently it seeks to develop policies that will strengthen Europe's capabilities in the new digital technologies, open new opportunities for businesses and consumers, support the green transition and help achieve climate neutrality by 2050.

Figure 1. The evolution of digitalization level in EU, 2017-2022



Source: author own processing based on Eurostat data

The long-term vision of the European Union on its competitiveness and the perspectives of the economy after 2030, published in March this year, highlights the fact that digitization is one of the main vectors of the economy [6]. As a consequence of the implementation of appropriate policies for stimulating digitalization, as it can be seen in Figure 1, the level of digitization at European Union level has increased from year to year, the digital intensity increasing with 129,47% from 2017 to 2022.

On the background of increasingly limited access to natural resources and the challenges generated by the effects of climate change, the theme of a more environmentally friendly and sustainable economy is increasingly present in the public policy makers and economic agent's discourse. Associated with sustainable development, the concept of the circular economy is increasingly seen as a lever for sustainable progress.

The circular economy involves a number of concepts such as sharing, renting, reusing, repairing, refurbishing and recycling materials and products. This approach has the effect of extending the life cycle of products and optimizing the consumption of raw materials and energy, minimizing the amount of waste generated, reducing the carbon footprint and more environmentally friendly approach.

In the case of the circular economy, we are talking about an integrative model, based on eco-innovation and eco-design, characterized by the 10 R concept: Refuse, Rethink, Reduce, Reuse, Repair, Restore, Remanufacture, Reorient, Recycle and Recover.

Refusal refers to making a product redundant by giving up at the function it provides (for example the option to refuse to use your own car for urban transportation, opting for public transport or a ride-sharing service).

Rethinking refers to increasing the use of a product, for example by sharing the product (for example in food industry, in order to reduce the amount of waste, it is used the collaborative approach to reduce the use of single-use packaging and the migration to reusable packaging).

Reduction refers to increasing efficiency in the production or use of the product by consuming fewer natural resources (for example, in the automotive industry where the pressure to reduce fuel consumption has intensified innovation and the successful launch of electric models).

Reuse refers to any operation by which products or components that have not become waste are used again for the same purpose for which they were designed.

Repair refers to the reconditioning or maintenance of the defective product so that it can be used with its original function.

Refurbishing refers to restoring an old product and updating it.

Remanufacturing refers to incorporating parts of the discarded product into another product with the same function. Old laptops and computers are reclaimed for parts to create refurbished products that can then be donated to schools.

Reorientation refers to the incorporation of the discarded product or parts of it into a new product with a different function. For example, paper, plastic, metal, wood and other materials left over from manufacturing processes can be reused to make various other items.

Recycling refers to any recovery operation whereby waste is transformed into products, materials or substances to fulfill their original function or for other purposes.

Recovery refers to the incineration of materials and energy recovery. We meet the model in the cement industry, where waste incineration is used in the manufacturing process or in the burning of non-recyclable materials to obtain energy [7].

In line with the Union's objective of achieving climate neutrality by 2050 under the Green Deal [8], the European Commission proposed, in March 2020, the first package of measures for the transition to a circular economy, included in the Circular Economy Action Plan [9]. Proposals include encouraging sustainable products, informing consumers for the green transition, revising building materials regulations and a strategy for sustainable textiles [10].

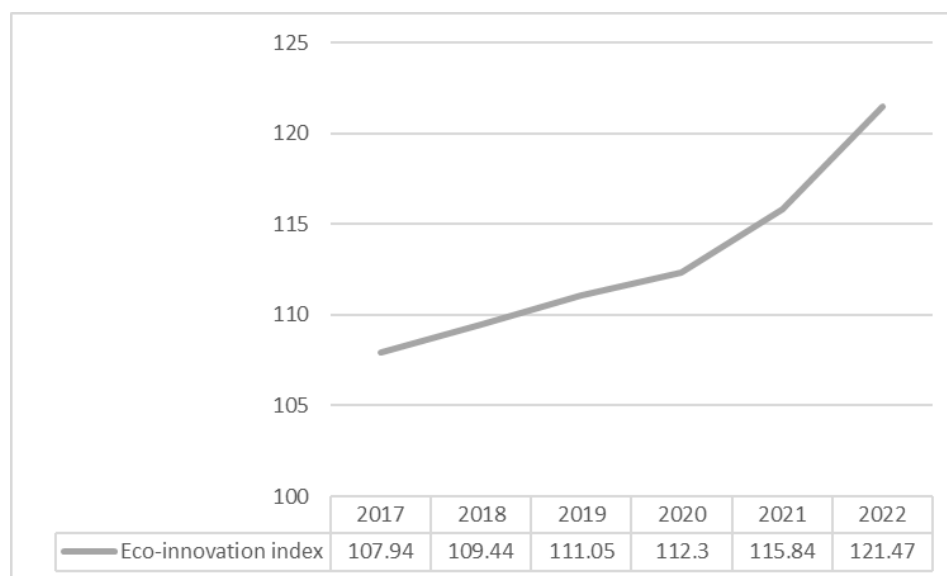
To achieve a circular economy, circularity and sustainability must be introduced at all stages of the value chain, from design to production and finally to the consumer. Circularity encourages innovation and job creation, and some experts believe that, by 2030, this model could generate an additional income of 4.5 trillion dollars globally [11].

The European Commission estimates that applying circular economy principles across the EU economy has the potential to increase EU GDP by an additional 0.5% by 2030, creating approximately 700,000 new jobs. There is a clear business case for individual companies too – since manufacturing firms in the EU spend on average approximately 40% of the total cost of goods on materials, closed-loop circular models can increase profitability and protect against price fluctuations [12].

In supporting the transition to a circular economy and achieving the objectives of the European Green Deal eco-innovation is vital, by reducing impacts on the environment, increasing resilience against external pressures and using resources more efficiently. [13]. The Eco-Innovation Scoreboard gathers data on eco-innovation performance across the EU and

beyond, thus helping to monitor and evaluate progress made since 2010. The Eco-Innovation Index measures the environmental innovation performance of EU Member States, on the basis of the 12 indicators included in the measurement framework. In the period 2017-2022, the Eco-innovation index at the EU level increased constantly, reaching in 2022 the value of 121.47 (+ 12.31% compared to 2017) as a result of the policies applied in the field of environment, research-innovation and digitalization.

Figure 2. The evolution of Eco-innovation index in EU, 2017-2022



Source: author own processing based on Eurostat data

Digital technologies play a key role, both directly and indirectly. On the one hand, they make it possible to create and manage the information required for complex circular supply chains and business models. On the other hand, they are the basis for products-as-a-service business models, a crucial part of the dematerialization process. Overall, digitally enabled transparency, efficiency and convenience are necessary to increase resource productivity and value retention to the point where a circular economy really begins [14].

With more data generated than ever before, improved exchange and provision of information is a cornerstone of the circular economy: now, companies must know the suppliers of their suppliers and the customers of their customers (ECERA, 2020). Precise and timely data are necessary for the safe processing of concentrated waste streams, safe sharing and recycling of products, increasing product longevity or improving material efficiency/replacing rare inputs with renewables. Shortened supply chains and localized/decentralized production also depend on digitalization. Improving connectivity and information sharing, offers significant benefits, by using blockchain to securely trace products and materials across their entire lifecycle and in all use environments [14].

Without a coherent and inclusive global digitization effort, climate goals will not be achieved in a timely manner. Furthermore, in order to achieve the 2050 climate goals, a coherent digital network must be created. This will have the same impact on the circular economy in the next 30 years as the Internet has had on the digitization of society in the last 30 years. Without a digital platform, the transition to a circular economy will occur more slowly, with fewer attractive circular business models and less impact on global climate goals, economic growth and poverty reduction [12].

3. CONCLUSIONS

Digital technologies will play a key role in Europe's transition to a more circular economy. Without them, a modern economy cannot become truly sustainable.

The digitization of the circular economy cannot be postponed; We don't need more conferences, reports and calculations. Our planet and the many people suffering from climate change compel us to act now. Governments, global organizations, industry associations and leading enterprises must take the initiative to ensure the focused, accelerated and responsible digitization of the circular economy. This is the only way we can achieve our ambitious climate goals and save our planet.

Through the transition of European states to the circular economy, the pressure on natural resources will be reduced and sustainable economic growth and new jobs will be ensured. Moreover, it will contribute decisively to reaching the 2050 targets on climate neutrality and biodiversity loss.

To a large extent, any successful transition to a CE will depend on the contributions and collaboration of consumers and citizens, on the way people live and consume materials and products. The better people are informed, the more they are aware of the impact their choices have, and the more rapid this process will be. Moreover, encouraging people to collect data and providing them with tools to make their wishes and concerns heard can improve monitoring of product lifecycles and other variables [14].

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