Peertechz

Journal of Civil Engineering and Environmental Sciences
ENGINEERING GROUP
OPEN ACCESS JOURNAL
ISSN: 2455-488X DOI: https://dx.doi.org/10.17352/jcees

Short Communication

Digital and Circular Economy Models

Giovanni Perillo*

Professor, University of Naples Parthenope, Italy

Received: 24 June, 2024
Accepted: 07 August, 2024
Published: 08 August, 2024

***Corresponding author:** Giovanni Perillo, Professor, University of Naples Parthenope, Italy,
E-mail: giovanni.perillo@uniparthenope.com

Keywords: Digital platform; Economic model; Blockchain solutions

Abstract

The Digital is playing an increasingly crucial role in facilitating the transition towards circular economy models. Digital technologies, in fact, offer innovative solutions to optimize the use of resources, extend the life cycle of products and close material loops. According to a report by Accenture, the adoption of digital technologies could increase resource productivity by 15% by 2030, helping to reduce CO_2 emissions by 7.5%. In particular, digital platforms for asset sharing and product-as-a-service, blockchain solutions for the traceability of materials, and enabling technologies for the recovery and recycling of resources are emerging as fundamental levers to enable circular economy practices on a large scale.

Introduction

The integration of digital technologies into the circular economy presents transformative opportunities for sustainable development. As the world grapples with resource depletion and environmental degradation, the circular economy offers a regenerative approach, emphasizing the reuse, repair, refurbishment, and recycling of materials. Digital technologies, such as the Internet of Things (IoT), Artificial Intelligence (AI), and blockchain, are pivotal in enhancing the efficiency and effectiveness of circular economy practices [1].

One of the primary benefits of digital technologies in the circular economy is the ability to optimize resource use. IoT devices can monitor and manage resources in real time, providing valuable data on consumption patterns and waste generation. This data can be analyzed using AI to identify inefficiencies and suggest improvements, leading to more sustainable resource management. For instance, smart sensors in manufacturing can detect when equipment needs maintenance, reducing downtime and extending the lifespan of machinery [2].

Digital platforms for asset sharing and product-as-a-service

Digital platforms are revolutionizing traditional consumption models, promoting access to products and services rather than their possession [3]. Asset-sharing platforms like FLOOW2, the first B2B marketplace for sharing assets between companies, allow you to optimize the use of underutilized resources, reducing waste and costs. Similarly, Product-as-a-Service (PaaS) is emerging as a circular business model where products are offered as subscription services [4]. According to Frost & Sullivan [5], 70% of Fortune 500 companies will adopt PaaS models by 2023. Success stories such as Philips Healthcare, which offers remote patient monitoring services, demonstrate the potential of PaaS to align the incentives of manufacturers and consumers toward a more efficient use of resources.

Blockchain solutions for material traceability

Blockchain is emerging as a key technology to enable the traceability of materials along circular supply chains [6]. Thanks to its decentralized and immutable nature, the blockchain allows you to certify the origin, quality, and path of materials, creating transparency and trust between the players in the value chain. For example, Dutch startup Circularise has developed a blockchain solution to track plastic materials from producer to recycler, facilitating the sourcing of high-quality recycled plastics. Similarly, the ReFlow pilot project is testing the use of blockchain to track organic waste flows in cities, improving the efficiency of collection and treatment. The adoption of blockchain in the context of the circular economy is still in its infancy but has the potential to unlock new opportunities for valorising materials [7].

Enabling technologies for the recovery and recycling of resources

Digital technologies such as the Internet of Things (IoT), artificial intelligence, and robotics are opening new frontiers for resource recovery and recycling [8]. The IoT allows you to monitor the status and location of products in real-time, facilitating their collection and reuse at the end of their life. Artificial intelligence can be applied to optimize waste sorting and recycling processes, improving the quality of recovered materials. For example, American startup AMP Robotics uses AI and computer vision to automate waste sorting in recycling facilities, increasing accuracy and speed compared to manual sorting. 3D printing is also emerging as an enabling technology for the circular economy, allowing components and products to be regenerated from recycled materials [9].

However, the transition to a digital circular economy is not without challenges. Data security and privacy concerns must be addressed to ensure that the vast amounts of data generated by IoT devices and digital platforms are protected. Additionally, there is a need for standardized protocols and regulations to govern the use of digital technologies in the circular economy. Collaboration among stakeholders, including governments, businesses, and consumers, is essential to overcome these challenges and realize the full potential of digital technologies in promoting a circular economy [10,11].

Conclusion

In conclusion, digital is proving to be a fundamental ally for the creation of circular economy models. Asset sharing and product-as-a-service platforms are redefining consumption models, while blockchain solutions and enabling technologies such as IoT, AI, and robotics are opening new avenues for asset traceability and recovery. However, to fully grasp the potential of digital for the circular economy, some challenges will need to be addressed, such as the lack of interoperability between solutions, the complexity of supply chains, and the lack of skills and infrastructure. It will therefore be crucial to promote collaboration between industry, governments, and the world of research to develop standards, policies, and governance models that allow the most promising solutions to scale. Only in this way will we be able to accelerate the transition towards a regenerative and sustainable economy, in which digital serves the well-being of people and the planet.

Acknowledgment

The following article was also written using the Microsoft copilot program for bibliographic research of the topics. The work was then revised by the author who assumes full responsibility for the contents.

References

1. Newsroom. Accenture [Internet]. Available from: https://newsroom.accenture.com/
2. Braungart M, McDonough W. Cradle to cradle : remaking the way we make things. North Point Press; 2005. Available from: https://mcdonough.com/cradle-to-cradle/
3. Geoffrey G. Parker, Marshall W. Van Alstyne, Sangeet Paul Choudary. Platform Revolution: How networked markets are transforming the economy--and how to make them work for you [Internet]. WW. Norton & Company; 2016. Available from: https://books.google.co.in/books/about/Platform_Revolution_How_Networked_Market.html?id=Bvd1CQAAQBAJ&redir_esc=y
4. Business-to-business asset sharing [Internet]. 2021. Available from: https://ellenmacarthurfoundation.org/circular-examples/business-to-business-asset-sharing
5. Frost & Sullivan. New Business Models - Frost & Sullivan [Internet]. Frost & Sullivan. 2024. Available from: https://www.frost.com/analytics/visionary-innovation/megatrends/new-business-models-value-many/
6. Norta A. Blockchain technology for secure internet-of-things. Available from: http://dx.doi.org/10.13140/RG.2.2.21366.83520
7. Wahl DC. Designing regenerative cultures. Triarchy Press. 2016. Available from: https://www.triarchypress.net/drc.html
8. Webster K. The circular economy: A wealth of flows. Ellen MacArthur Foundation Publishing. 2017. Available from: https://books.google.co.in/books/about/The_Circular_Economy.html?id=c7QujgEACAAJ&redir_esc=y
9. Raworth K. Doughnut economics: Seven ways to think like a 21st-century economist. Chelsea Green Publishing; 2017. Available from: https://books.google.co.in/books/about/Doughnut_Economics.html?id=7A4lDgAAQBAJ&redir_esc=y
10. Scharmer O. The essentials of Theory U: Core principles and applications. Berrett-Koehler Publishers; 2018. Available from: https://www.researchgate.net/publication/327270280_The_Essentials_of_Theory_U_Core_Principles_and_Applications
11. Robertson M. Sustainability principles and practice. Routledge; 2017. Available from: https://doi.org/10.9774/gleaf.9781315625478

Citation: Perillo G. Digital and Circular Economy Models. J Civil Eng Environ Sci. 2024;10(2): 061-062. Available from: https://dx.doi.org/10.17352/2455-488X.000085