Circular Economy Applied to the Automotive Industry

Ștefan-Alexandru Catană
Sorin-George Toma
Cătălin Grădinaru
University of Bucharest, Faculty of Business and Administration, Romania
stefan.catana@faa.unibuc.ro
tomagsorin62@yahoo.com
catalin.gradinaru@faa.unibuc.ro

Abstract

The subject of the circular economy is an essential societal topic in nowadays society. In the last years, in the automotive industry, the evolution of regulatory and economic circumstances has led to the development of networks to reuse, refurbish, remanufacture, recycle and recover components, elements, equipment, and materials embedded in end-of-life vehicles. The paper aims to briefly present and better understand the concept of the circular economy within the automotive industry. The methodological approach was based on a qualitative research method. The paper shows that despite the main barriers to reuse, recycling, and recovery performance improvement are economic and technical, in the automotive industry, the circular economy was based on the idea that, on one hand, over the world, the natural resources are limited and, on the other hand, it is important to augment the functioning of the ecosystem and, consequently, the human well-being.

Key words: circular economy, automotive industry, company
J.E.L. classification: A12, A13, L62

1. Introduction

The subject of the circular economy is an essential societal topic in nowadays society. The theme is increasingly gaining traction in academia, business, and politics (Geissdoerfer *et al*, 2017). It is a hot topic nowadays being of interest both for public and private organizations (Toma *et al*, 2019), and for people, in general (Owojori *et al*, 2022). Moreover, the COVID-19 pandemic accelerated the process focused on sustainability (Catană, 2020). In order to have sustainable economic growth, and sustainable consumption, the European Union has implemented some economic policy measures to promote the circular economy (Nistor *et al*, 2021).

As a highly competitive industry, the automotive industry represents an environment in which is difficult to obtain considerable competitive advantages and it is rather hard to differentiate from other competitors (Catană *et al,* 2021). Consequently, innovation is a powerful driver for companies around the world, enabling them to achieve success (Grădinaru *et al*, 2020).

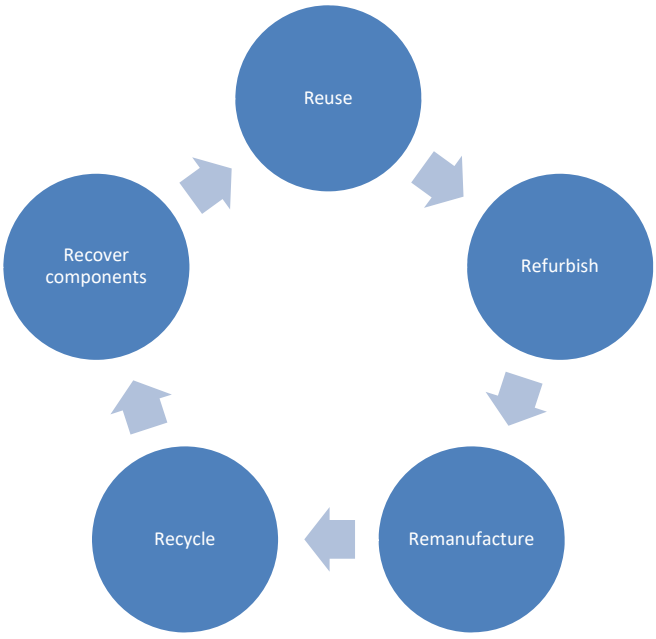
Starting from the above considerations, this study is focused on showing the implications of the circular economy in the automotive industry. The paper aims to briefly present and better understand the concept of the circular economy within the automotive industry. The structure of the paper is as follows: the second section shows the literature review. The third part of the paper displays the research methodology. The outcomes of the study are exhibited in the fourth section. At the end, the fifth section presents the conclusions along with the research limitations.

2. Literature review

The last decades have witnessed the rise of studies related to the circular economy (or "green economy" or "closed-loop economy" or "circularity" or "sustainable development goals") (Kayikci, *et al*, 2021). The reason lies in the fact that pressing challenges such as environmental pollution, and climate change have led many economies to reconsider their strategies to balance growth and sustainability (Lehmann *et al*, 2022; United Nations Environment Programme, 2022). Moreover, there are authors that consider that the circular economy is a multidimensional phenomenon (de Jesus *et al*, 2018; Ünal *et al*, 2019). This is also why numerous companies, especially from the automotive industry, have fully understood the need to think and act not only strategically (Toma, 2008; Toma *et al*, 2015; Toma *et al*, 2016) but also in an creative, innovative (Toma *et al*, 2018) and entrepreneurial (Marinescu *et al*, 2013; Grădinaru *et al*, 2017; Marinescu *et al*, 2017), and social responsible (Toma *et al,* 2009; Toma *et al*, 2011) manner in an ever changing global business environment (Săseanu *et al*, 2014), specific to the nowadays Fourth Industrial Revolution (Tohănean *et al*, 2018).

There is not a standard definition for the circular economy concept (Kirchherr *et al*, 2018). As a term belonging to sustainability, it has been defined in many ways. In this respect, Geissedoerfer *et al* (p.757) define the concept as "a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops". Starting from this conceptual definition, in the last years, in the automotive industry, the evolution of regulatory and economic circumstances has led to the development of networks to reuse, refurbish, remanufacture, recycle and recover components, elements, equipment, and materials embedded in end-of-life vehicles (Despeisse *et al*, 2015). Each of these networks influences the circular economy in the automotive industry (Figure no. 1).

Figure no. 1. The circular economy in the automotive industry



Source: (Authors, adapted from Despeisse, et al., 2015)

Over time, the scientific literature regarding the concept of the circular economy was developed and, starting from equity, transparency and resilience, there were highlighted the following 7 pillars of the circular economy (Gladek, 2017):

- The use of materials at continuous high value;
- All energy is based on renewable sources;

- Biodiversity is supported and enhanced through human activity;
- The preservation of human society and culture;
- The structural support of humans' health and wellbeing;
- The propagation of societal value is maximized by human activities;
- The sustainable extraction and use of water resources.

3. Research methodology

In the beginning, the authors investigated the scientific literature on the circular economy topic and its implications in the automotive industry. In order to attain the aim of the paper, they utilized a qualitative research method. The information was collected through desk research (Hague, 2022), and the secondary data had been gathered through the organization of an extensive literature review from different sources, such as books and journals in the fields of business and economics. The documents were originated in prestigious scientific databases, such as Web of Science, Science Direct, SAGE, Scopus, Emerald Insight, and Google Scholar.

4. Findings and discussion

In essence, the circular economy was based on the idea that, on one hand, over the world, the natural resources are limited and, on the other hand, it is important to augment the functioning of the ecosystem and, consequently, the human well-being.

In order to incorporate the circular economy in their business strategies, companies in the automotive industry have different visions, as follows:

- Designing sustainable vehicles from recycled and recoverable materials is at the core of Renault Group. Its activity is also based on reconditioning spare parts, re-using batteries from electric-vehicle, or providing ever cleaner and more sustainable car-sharing services (Renault, 2020).
- Skoda perceives the circular economy based on the following concepts: minimizing negative impacts on the environment, input resources and the loss of these resources, and conversely maximizing the circulation of resources (Skoda, 2021).
- The BMW vision of the circular economy is established on protecting and preserving the environment, reusing valuable resources several times, and ensuring that nothing ends up going to waste (BMW Group, 2021).
- Mazda is expecting a significant reduction in energy and resource losses throughout the entire vehicle manufacturing supply chain, as a result of efforts to make the process more efficient (Mazda, 2021).

All in all, speaking about the green problems, the automotive industry has certainly been part of this issue, but it can be also part of the solution. Firstly, more and more companies in the automotive industry consider that the circular economy is an important topic. Secondly, all major car manufacturers have in their portfolio models of environmentally friendly cars, made of recyclable materials. Thirdly, the petrol and diesel prices crisis will conduct people to be more and more interested in acquiring electric cars.

5. Conclusions

In the last years, the topic of the circular economy become present in all public debates, at all levels. Starting from this fact, from the company's point of view, rising consumer expectations regarding the characteristics of cars, have been imposed worldwide by car manufacturers to provide their customers with the best customer experience possible (Toma & Catană, 2021). Consequently, the regulators, on one hand, and the companies and people, on the other hand, had to adapt to this new reality.

In the automotive industry, the main barriers to reuse, recycling, and recovery performance improvement are economic and technical. However, this industry has proved its capacity to provide numerous solutions to solve the problems related to the circular economy.

The paper demonstrates that the circular economy constitutes a holistic concept. It also shows the importance of this topic in the automotive industry.

Regarding the future research directions, other studies may consider a larger number of car manufacturers and analyze their visions regarding the subject. Moreover, they can reveal the perceptions of people regarding these visions and actions.

6. References

- BMW Group, 2021. *The future is circular*. [online] Available at: https://www.bmwgroup.com/en/report/2021/bmw-group-report/the-future-is-circular/index.html [Accessed 19 June 2022].
- Catană, S.-A., 2020. *Coronavirus (COVID-19) pandemic - effects and correlations in the European Union countries*. SEA - Practical Applications of Science, VIII(23), pp.169-174.
- Catană, Ș. and Toma, S.-G., 2021. *Marketing mix and corporate social responsability in automotive industry - Case study: Mazda Motor Corporation*. Annals of the „Constantin Brâncuși" University of Târgu Jiu, Economy Series, 1, pp.205-209.
- de Jesus, A. and Mendonça, S., 2018. Lost in Transition? Drivers and Barriers in the Eco-innovation Road to the Circular Economy. *Ecological Economics*, 145, pp. 75-89.
- Despeisse, M., Kishita, Y., Nakano, M. and Barwood, M., 2015. *Towards a circular economy for end-of-life vehicles: A comparative study UK – Japan*. Procedia CIRP, pp.668-673.
- Geissdoerfer, M., Savaget, P., Bocken, N. and Hultink, E., 2017. The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production*, 143, pp.757-768.
- Gladek, E., 2017. *The Seven Pillars of the Circular Economy*. [online] Available at: https://www.metabolic.nl/news/the-seven-pillars-of-the-circular-economy/?gclid=CjwKCAjwtcCVBhA0EiwAT1fY7y3dilIxML2WXQ1i40n5rnvxZYHlzLAa6lxOdaAehjyjtfkM86GiBRoCAr8QAvD_BwE [Accessed 19 June 2022].
- Grădinaru, C., Toma, S.-G. and Papuc, R., 2017. Entrepreneurship in the world: The analysis of the Global Entrepreneurship Index in the period 2015-2017. *Ovidius University Annals: Economic Sciences Series*, XVII(2), pp.14-18.
- Grădinaru, C., Toma, S.-G. and Catană, Ș., 2020. Innovation around the world: An analysis of the top 10 most innovative companies in the period 2018-2020. *"Ovidius" University Annals, Economic Sciences Series,* XX(2), pp.340-346.
- Hague, P., 2022. *Market Research in Practice: An Introduction to Gaining Greater Market Insight*. 4th edition. London: Kogan Page.
- Kayikci, Y., Kazancoglu, Y., Lafci, C. and Gozacan, N., 2021. Exploring barriers to smart and sustainable circular economy: The case of an automotive eco-cluster. *Journal of Cleaner Production*, Volumul 314, p. 127920.
- Kirchherr, J. et al., 2018. Barriers to the Circular Economy: Evidence From the European Union (EU). *Ecological Economics*, 150, pp.264-272.
- Lehmann, C., Cruz-Jesus, F., Oliveira, T. and Damasio, B., 2022. Leveraging the circular economy: Investment and innovation as drivers. *Journal of Cleaner Production*, 360, p.132146.
- Marinescu, P. and Toma, S.-G., 2013. Training programs- Training and development alternatives for students. *Procedia Economics and Finance*, 6, pp.306-312.
- Marinescu, P., Toma, S.-G., Miulescu, G.-F. and Grădinaru, C., 2017. Entrepreneurship: from education to innovation. *Manager*, 26, pp.146-156.
- Mazda, 2021. *Mazda Sustainability Report.* [online] Available at: https://www.mazda.com/globalassets/en/assets/sustainability/download/2021/2021_14-15.pdf [Accessed 18 June 2022].
- Mazda, 2022. *Social contributions initiatives*. [online] Available at: https://www.mazda.com/en/sustainability/social/library/ [Accessed 17 June 2022].
- Nistor, C. and Herman, R., 2021. Green cities - a key element of the sustainable economy. *Manager*, 34, pp.16-36.
- Owojori, O. and Okoro, C., 2022. The Private Sector Role as a Key Supporting Stakeholder towards Circular Economy in the Built Environment: A Scientometric and Content Analysis. *Buildings,* 12, p. 695.
- Renault, 2020. *Renault Group - Circular economy: moving up a gear*. [online] Available at: https://www.renaultgroup.com/en/news-on-air/news/circular-economy-moving-up-a-gear/ [Accessed18 June 2022].

- Săseanu, A.-S., Toma, S.-G. and Marinescu, P., 2014. Feminine leadership and organisational culture. *Manager*, 19(1), pp.144-150.
- Skoda, 2021. *Skoda – Raw materials: recycling and reuse.* [online] Available at: https://www.skoda-storyboard.com/en/skoda-world/innovation-and-technology/raw-materials-recycling-and-reuse/ [Accessed 18 June 2022].
- Tohănean, D., Toma, S.-G. and Dumitru, I., 2018. Organizational performance and digitalization in Industry 4.0. *Journal of Emerging Trends in Marketing and Management*, 1(1), pp.282-293.
- Toma, S.-G., 2008. What is Six Sigma? *Manager*, 8, pp.152–155.
- Toma, S.-G and Naruo, S., 2009. Quality assurance in the Japanese universities. *Amfiteatru Economic*, 11(26), pp.574-584.
- Toma, S.-G., Stanciu, C. and Irimia, E., 2011. *Landmarks in the evolution of social responsibility of organizations in the twentieth century*. Proceedings of the 5th International Scientific Session Challenges of the Knowledge Society. Bucharest: PRO Universitaria Publishing House. pp.1352-1360.
- Toma, S.-G. and Grădinaru, C., 2015. From military strategy to business strategy. *Strategii Manageriale,* 31(1), pp.227-233.
- Toma, S.-G., Marinescu, P. and Grădinaru, C., 2016. Strategic planning and strategic thinking. *Revista Economică*, 68(5), pp.168-175.
- Toma, S-G., Peptenatu, D., Andronache, I., Ahammer, H., Pintilii, R-D., Draghici, C-C. and Simion, A. G.,
  2018a. The creative economy in Romania, a key factor of economic integration in the European Union. In: Dima, A., ed. 2018. *Doing Business in Europe*. 329–350. Cham: Springer. pp.329-350.h
- Toma, S.-G., Peptenatu, D., Andronache, I., Ahammer, H., Pintilii, R-D., Draghici, C-C. and Simion, A. G.,
  2018. The creative economy in Romania, a key factor of economic integration in the European Union. In: Dima, A., ed. 2018. *Doing Business in Europe*. 329–350. Cham: Springer. pp.329-350.
- Toma, S.-G. and Tohănean, D., 2019. Green business models: the case of a German automaker. *Quality-Access to Success, 20(2)*, pp. 635-640.
- Toma, S.-G. and Catană, Ș., 2021. Linking customer experience with the extended marketing mix. *Annals of the "Constantin Brâncuși" University of Târgu-Jiu, Economy Series*, 5, pp.105-109.
- Ünal, E. and Shao, J., 2019. A taxonomy of circular economy implementation strategies for manufacturing firms: Analysis of 391 cradle-to-cradle products. Journal of Cleaner Production, 212, pp.754-765.
- United Nations Environment Programme, 2022. *Annual Report 2021*. [online] Available at: https://www.unep.org/annualreport/2021/index.php [Accessed 15 June 2022].