Economics and Business
ISSN 2256-0394 (online)
2025, *39*, 1–12
https://doi.org/10.7250/eb-2025-0001
Published by RTU Press

INNOVATIVENESS TOWARDS TRANSFORMATION FROM LINEAR TO CIRCULAR ECONOMY

Agnė ŠIMELYTĖ

Vilnius Gediminas Technical University (VilniusTech), Vilnius, Lithuania

Corresponding author's e-mail: agne.simelyte@vilniustech.lt

Received 6.11.2024; accepted 8.12.2024

Abstract. Knowledge/technology transfer stimulates the development of new technologies and products and even transfer from a linear economy to more friendly business activities. The problem of climate change and the constantly increasing volume of various waste causes challenges and, at the same time, opportunities for business development. Transition to circular economy might decline energy from fossil resources and lower business influence on the climate change. However, the shift to new business models requires new knowledge and technology. Thus, the adoption of good practices or gained knowledge or technology speeds up the transition to a circular economy. The aim of the paper is to explore the complex relationships between knowledge transfer and circular economy. The study was based on a questionnaire. For evaluation, the 5-point Likert scale has been used. The survey has been carried out by the CATI principle. For the analysis of the results, the research applied descriptive statistics and correlation. Empirical research focuses on Nordic MNCs in Lithuania and Estonia. The results proved that companies tend to develop innovations or new products. Additionally, they have a positive attitude towards transferring their own business to the circular economy. The results fulfil the gap in the interlinkages between the theory of circular economy and the innovations concept.

Keywords: *Estonia, circular economy, innovation, knowledge transfer, Lithuania, linear economy, Nordic capital.*

JEL Classification: F64, Q55, Q56

INTRODUCTION

The transition from a linear economy to a circular economy (CE) necessitates a profound transformation in business models, practices, and mindsets. Knowledge transfer plays a pivotal role in this transition, as it enables organizations to assimilate new information, innovate, and implement sustainable practices effectively. However, several obstacles impede this process, including challenges related to knowledge assimilation, organizational culture, and the external environment. One of the primary obstacles to transferring from a linear to a circular economy is the difficulty in knowledge assimilation within organizations. The concept of absorptive capacity, which encompasses knowledge acquisition,

assimilation, transformation, and exploitation, is crucial for organizations aiming to innovate and transition to circular practices. Without robust mechanisms for knowledge assimilation, companies may struggle to implement effective circular strategies, leading to stagnation in their transition efforts. Moreover, organizational culture can either facilitate or hinder the adoption of circular economy practices. What factors are essential in cooperation and knowledge transfer to transfer the business model to a circular economy? The aim of the paper is to explore the complex interlinkages between knowledge transfer and circular economy.

1. LITERATURE REVIEW

1.1. The Concept of Circular Economy and Its Interlinkages with Innovation and Knowledge Transfer

The circular economy is an economic system that aims to counter the linear open-ended model of production, consumption, and disposal. It strives to achieve sustainable development by simultaneously enhancing environmental quality, economic prosperity, and social equity for the benefit of current and future generations (Suzanne et al., 2020). In this system, products are kept in use for as long as possible and recycled at the end of their life, contrasting with the traditional linear economy approach (Okorie et al., 2018). The concept of a circular economy is rooted in designing products that can be fully recycled, emphasizing the importance of closing material and energy loops (Awan et al., 2020).

The transition to a circular economy (CE) represents a paradigm shift in how industries approach resource management, innovation, and sustainability. This transition is characterized by a systemic rethinking of production and consumption patterns, emphasizing the importance of eco-innovation, digitalization, and collaborative frameworks among stakeholders. A critical aspect of advancing the circular economy is the integration of technological innovations that enhance resource efficiency and promote sustainable practices. The role of eco-innovation is also pivotal in this transition. Eco-innovation encompasses the development of new products, processes, and management practices that align with circular economy principles. For instance, Maldonado-Guzmán et al. (2020) argue that eco-innovation is essential for transitioning from linear to circular production processes, highlighting its strong relationship with circular economy activities. Moreover, the implementation of circular economy principles often requires collaborative efforts among various stakeholders, including businesses, policymakers, and consumers. Santos et al. (2023) pointed out that forming strategic alliances is crucial for fostering innovation in the energy sector, although many companies are still tentative in reporting cooperative initiatives that could enhance knowledge and technology sharing. This collaborative approach is further emphasized by who notes that the circular economy serves as a sustainable development strategy to address environmental degradation and resource scarcity through its core principles of reducing, reusing, and recycling materials. Despite the promising potential of the circular economy, challenges remain in its implementation. Companies, particularly small and medium-sized enterprises (SMEs), face barriers such as

financial constraints and a lack of technical skills, which hinder their transition to circular business models. Additionally, highlight the need for a deeper understanding of how companies can effectively tackle the complexities associated with this transition. To overcome these challenges, integrated strategies that encompass supply chain optimization and sustainable product design are essential, as suggested by Lahti et al. (2018). In conclusion, the transition to a circular economy is multifaceted, involving technological innovation, eco-innovation, and collaborative frameworks. While the potential benefits are significant, addressing the barriers to implementation is crucial for realizing a sustainable and resilient economy.

1.2. The Constraints for Transfer to a Circular Economy

The transition to a circular economy (CE) is fraught with numerous obstacles that hinder its effective implementation across various sectors. These barriers can be categorized into financial, organizational, cultural, and consumer-related challenges, each of which plays a significant role in impeding the shift from a linear to a circular economic model. Financial constraints are among the most pressing barriers to the adoption of circular economy practices. Many businesses, particularly small and medium-sized enterprises (SMEs), face high upfront investment costs associated with transitioning to circular business models. Rizos et al. (2016) emphasize that the lack of financial resources and limited funding options significantly challenge SMEs in their efforts to implement circular practices. Similarly, Kirchherr et al. (2018) identify financial limitations as a critical barrier across the European Union where, despite policy initiatives aimed at promoting CE, many companies struggle to secure the necessary funding for circular initiatives. This financial strain is compounded by the need for companies to redesign products and processes to align with circular principles, which often requires substantial investment in new technologies and training (Holly et al., 2023). Organizational culture and internal dynamics also present significant obstacles to the transition to a circular economy. Sawe et al. (2021) highlight that cultural and behavioural factor within organizations can either facilitate or obstruct the adoption of circular practices. For instance, a lack of awareness or understanding of circular economy concepts among employees can lead to resistance against necessary changes in processes and practices. Moreover, Holly et al. (2023) pointed out that the complexity of establishing effective circular supply chains adds another layer of difficulty, as companies often lack the necessary expertise and experience to navigate this transition. The interdisciplinary nature of the challenges further complicates the transformation process, necessitating a holistic approach that integrates various organizational functions. Consumer behaviour and perceptions are also critical barriers to the successful implementation of circular economy strategies. Camacho-Otero et al. (2018) note that consumer acceptance of circular solutions is often lacking, which can significantly hinder market demand for circular products. Szilagyi et al. (2022) reinforce this by indicating that a lack of consumer interest and awareness about the benefits of circular economy practices poses a substantial challenge. To foster a successful transition, it is essential to engage consumers and educate them about the advantages of sustainable

consumption habits, as their support is crucial for driving demand for circular products and services. In addition to these barriers, regulatory and institutional challenges can impede the transition to a circular economy. Gechbaia (2023) discusses how existing business models often do not align with circular principles, and regulatory frameworks may not adequately support or incentivize circular practices. This misalignment can create uncertainty for businesses considering the transition, as they may be unsure of the regulatory landscape and potential repercussions of adopting circular practices.

However, achieving this transition fully requires substantial funding for circular businesses and projects (Ozili, 2022). Especially knowledge transfer is supposed to make a great impact in this transition. As companies, they learn from the other's experience. Knowledge and technologies might be gained over foreign direct investment (FDI). Scientific studies (Silajdzic & Mehić, 2015), in most cases, prove that FDI is a significant determinant of economic growth through knowledge spillovers, particularly in transition economies. Thus, FDI can facilitate the transfer of technology and capital, enabling countries to adopt advanced practices essential for a circular economy (Nwagu & Enofe, 2021; Ignjatovič et al, 2024). Moreover, the correlation between economic complexity and the pattern of FDI flows shows that it influences the allocation of investments across different sectors, potentially impacting the transition to a circular economy (Gómez-Zaldívar et al., 2021).

In various studies in manufacturing firms, approaches to the circular economy are determined by specific drivers Gusmerotti et al. (2019). From a supply chain perspective, systematic reviews have identified drivers, barriers, and practices that impact the adoption of circular economy principles (Govindan & Hasanagic, 2018). The transition to a circular economy involves eco-innovation, where drivers and barriers play significant roles in shaping the path towards circularity (De Jesus & Mendonca, 2018). In specific contexts, such as in China, drivers for circular economy implementation have been studied to understand the outcomes and challenges of transitioning to circular practices (Li et al., 2023). In addition, entrepreneurial initiatives, like academic spin-offs, have been recognized as drivers for developing circular business models, facilitating the transition from a linear to a circular economy (Poponi et al., 2022). Moreover, in agroproduce supply chains, factors enabling sustainable circular economy practices have been explored to promote the implementation of circularity in a sustainable manner (Avikal et al., 2021). Financial support and initiatives might be defined as one of the drivers promoting transfer from a linear to a circular economy. Financing-related drivers and barriers have been investigated to develop a conceptual model that aids in understanding the financial dynamics of circular economy businesses (Saarinen & Aarikka-Stenroos, 2022). Additionally, in born-sustainable business models, drivers for implementing the circular economy have been studied, particularly in industries like fashion, where sustainable development knowledge influences innovation and circular practices (Ostermann et al., 2021). These studies collectively emphasize the importance of understanding and leveraging diverse drivers to propel the transition towards a circular economy.

Knowledge and technology transfer often occur within the partnership network. The network might involve various different companies, public institutions,

research centres, universities or hubs. Particularly, highly qualified researchers employed by the universities create added value in knowledge transfer. Thus, university-company networking and joint projects might be beneficial for both sides. In addition, the company-company network might result in the development of innovation or at least knowledge transfer and transition to a circular economy. Additionally, good knowledge management practices are important for organizational sustainability within a circular economy framework, and possessing the right design competencies is influential for the successful implementation of circular economy principles. According to MacArthur (2013), the circular economy is defined as an industrial system that is restorative or regenerative by intention and design. In the context of a circular economy, close knowledge-related collaboration from all stakeholders and continuous improvement in specific business processes are preconditions for organizational sustainability and for a circular flow of manufacturing processes. In the context of the circular economy, innovation facilitates sustainable practices and economic growth. Furthermore, innovation encourages the development and implementation of circular business models that create value through resource recovery and sustainable practices and vice versa. Some studies have shown that innovation in the business model for the circular economy can lead to differentiated opportunities for value creation (Kuzma et al., 2022). Furthermore, innovation capabilities, frugal innovation, and knowledge-sharing practices accelerate the inter-play between innovation and value creation within the circular economy (Yousaf et al., 2022). Research has also highlighted the significance of organizational capabilities and disruptive innovation in fostering circularity and sustainable development. Studies have shown that incumbents can overcome the innovator's dilemma and realize disruptive circular innovation by leveraging their organizational capabilities (Koszewska, 2018). Additionally, disruptive innovation in start-ups, supported by the principles of the circular economy, can pave the way for sustainable development and the adoption of circular practices (Sehnem et al., 2023). Moreover, the circular economy is closely linked to eco-innovation, which is recognized as a key mechanism for transitioning from a linear to a circular economy. Eco-innovation, encompassing innovative products, processes, and management practices, boosts circular economy activities and promotes sustainability in various industries, for example, in the automotive sector (Maldonado-Guzmán et al., 2020). In conclusion, innovation is a driving force behind the transition to a circular economy. By fostering innovation in business models, organizational capabilities, and eco-friendly practices, companies can effectively implement circular economy principles, reduce material waste, and create sustainable value chains.

2. METHODS, SAMPLE AND DATA

The research is devoted to exploring how knowledge transfer impacts company’s decision to transform the business from a linear to a circular economy. The questionnaire has been developed in line with the previous similar studies (Agusti et al., 2022; Holmström et al., 2022). The survey has been carried out in Lithuania and Estonia, focusing on the companies that are networking with the

Nordic capital companies. The questionnaire has been divided into several parts. The first questions have been devoted to discovering whether any business relationships exist between the companies that participated in the research and Nordic countries. This part indicated how companies and for what reason develop networks or collaborate. Another question helped to indicate the country of the partnering company. The fourth question indicated the partner's main activities, such as university, technology centre, hub, cluster, laboratory, other public institution, private capital company, or state-owned company. The next section involved ten statements that were directed to understand whether the company is an innovator or an imitator. Nine types of innovations have been provided to the companies: "...improved product's quality…", "…new functions have been introduced into product …", "…company provided additional services related to the product…", "…product improvement…", "…manufacturing process's improvement…", "distribution process's improvement…", "…organizational process…", "… new packaging.", "…new promotional strategy…", "…social innovations…". The next section was devoted to understanding how knowledge transfer affects the possibility of transfer. In this section 9 items have been included: "…knowledge transfer/assimilation stimulate the use of renewables' resources are important" (Q1), "knowledge transfer/assimilation impacts repairing, refurbishing and resales" (Q2), "participation in knowledge dissemination networks promotes knowledge transfer/assimilation" (Q3), "knowledge transfer/assimilation stimulates technological innovation through digitization" (Q4), "advising on the application of new knowledge in digital technology management" (Q5), "exchange of knowledge and good practice stimulate assimilation and transformation of knowledge " (Q6), "knowledge exploitation reflects on development of new production processes" (Q7), "knowledge transfer/assimilation stimulate the use of secondary raw materials" (Q8), "knowledge transfer/assimilation stimulates reverse logistics" (Q9). For evaluation, the 5-point Likert scale has been used. The survey was carried out by means of the computer assisted telephone interview method by a professional surveyor. The targeted respondents were CEOs of targeted companies. Invest Lithuania and the Nordic Chamber of Commerce have assisted in creating lists of targeted companies. Lists provided by these agencies included the contact information of targeted companies. The companies employing more than 10 people were included in the list, which in total made 1160 companies. The companies in the list were distributed un-proportioned within various sectors. 951 Nordic capital-controlled enterprises are operating in Lithuania, which makes 15.3 % of all foreign capital enterprises. Swedish capital companies made the greatest turnover (EUR 1 781 097.294 thousand) within the period 2005–2021, and Finland takes the second place with an average turnover of EUR 1 509 985.059 thousand. The lowest turnover was that of Icelandic capital companies, as it is the lowest number of companies controlled by Iceland's capital. More than 50 % of respondents were operating in manufacturing, nine percent were involved in trading, and only 3 % were operating in the financial sectors; the other service sectors, such as logistics and transportation, IT, and business consultation, made up 8 % each. The responsiveness rate was 14 % corresponding, which made up 159 respondents. The research focused on niche business companies. The obtained

results are statistically significant in relation to how the survey population has been composed based on the origin of the capital, the size and the sectors. The responsiveness rate is also in line with the previous studies of Holmström-Lind et al. (2022). Statistically, 60 % of Nordic capital companies operating in the Baltic States are defined as SMEs, and large MNCs make up only nine percent. The greatest number of foreign capital companies that participated in the survey were from Finland, Sweden, and Norway, which made 40 %, 27 %, and 18 % of respondents, respectively.

3. RESULTS

There are currently more than 700 capital companies from Nordic countries in Lithuania. They have created more than 43 thousand jobs and, at the same time, receive billions of euros in revenue. 4–8 percent fall into the high and highest-risk class companies, and 78 % to 81 % of these companies belong to the low and medium bankruptcy classes. Most of them are Danish capital companies – 233 (33 %) and Swedish companies – 222 (31.4 %), followed by Norwegian capital companies – 151 (21.4 %), and Finnish capital companies – 100 (14.2 %). Danish, Norwegian, Finnish and Swedish capital companies are referred to in this notice as companies whose shareholders are legal or natural persons of the respective countries. Among these companies, the majority (202 companies, 28.6 %) operate in the service sector, 150 (21.2 %) carry out wholesale or retail trade, 138 (19.5 %) are representatives of the manufacturing industry, 64 (9 %) – agricultural companies, and 57 (8 %) are engaged in real estate operations. There are fewer companies belonging to other sectors: 39 (5.5 %) are transport companies, 29 (4.1 %) are construction companies, 15 (2.1 %) carry out financial activities, 5 supply electricity, gas or water, 4 manage hotels or restaurants, in other areas these companies have units. In total, capital companies from Nordic countries have created more than 43.2 thousand jobs. 16 578 employees work in companies with Swedish capital, 12 305 with Danish capital, 8951 with Norwegian capital, and 5394 with Finnish capital. Nordic countries such as Sweden, Finland, Norway, Denmark and Iceland are known for their advanced innovation systems and continuous economic growth. In these countries, innovation not only promotes technological progress but also improves the quality of life and promotes social equality and environmental sustainability. Lithuania has great potential for innovation, which can be used to strengthen the economy, improve the quality of life and promote social progress. The country's geographical position, educated workforce and favourable business conditions provide a solid basis for the development of innovative ideas and technologies. However, along with the opportunities, there are also a number of challenges that can affect the development of innovations. Descriptive statistics (Table 1) show that companies indicated the high importance of knowledge transfer/assimilation in promoting the use of renewable energy.

Table 1. Descriptive Statistics

	Min	Max	Mean		Std. deviation	Variance
			Statistic	Std. error	Statistic	Statistic
Renewables' resources	1.00	5.00	4.0823	0.09416	1.18357	1.401
Use of the product by repair	1.00	5.00	3.8987	0.09426	1.18478	1.404
Participation in knowledge dissemination networks	1.00	5.00	3.8165	0.07286	0.91581	0.839
Stimulates technological innovation through digitization	1.00	5.00	4.3101	0.06592	0.82864	0.687
Advertising on the application	1.00	5.00	3.9494	0.07608	0.95636	0.915
Knowledge and good practice exchange	1.00	5.00	4.4114	0.05965	0.74977	0.562
Development of new production processes	1.00	5.00	4.1709	0.08041	1.01073	1.022
Use of secondary raw materials	1.00	5.00	3.7785	0.09903	1.24473	1.549
Stimulates application of reverse logistics	1.00	5.00	3.4304	0.10562	1.32764	1.763

The companies identified the exchange of knowledge and good practices as one of the most important factors for transferring to a circular economy. Additionally, respondents were confident that knowledge transfer/assimilation stimulates technological innovation through digitization, which has an impact on transfer from a linear to a circular economy (average = 4.3). Development of new products took third place according to the importance of transferring to a circular economy (average = 4.17). This means that companies may consider transferring to a circular economy while developing new products and changing the business model. Knowledge transfer/assimilation has a similar importance in extending the use of the product by repair, participation in knowledge dissemination networks, and advertising on the application of new knowledge in digital technology, with an average value of approximately 3.9. Although all values varied from 3.4 to 4.4, the least important factor that is influenced by knowledge transfer assimilation is reverse logistics. Further, the authors have estimated the correlation coefficient. The estimated correlation (Table 2) indicated that significant interlinkages exist between almost all variables with a few exceptions.

First of all, there is no significant correlation between Q4 and Q9, i.e., knowledge transfer/assimilation stimulates technological innovation through digitization" and stimulates the application of reverse logistics, and Q2 and Q4, i.e., "impacts extending the use of the product by repair, refurbishment and resale" and "knowledge transfer/assimilation stimulates technological innovation through digitization". Meanwhile, the greatest relationship has been noticed between

"renewable energy sources, biological or potentially recyclable materials" and use of recycled materials ($r = 0.563$). The second strongest relationship is between "extending the use of the product by repair" and "reverse logistics" ($r = 0.509$).

Table 2. Correlation Table

	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**
Q1	1								
Q2	0.422**	1							
Q3	0.341**	0.346**	1						
Q4	0.249**	0.171	0.368**	1					
Q5	0.159*	0.232**	0.381**	0.428**	1				
Q6	0.253**	0.180*	0.353**	0.459*	0.356**	1			
Q7	0.403**	0.424**	0.441**	0.404**	0.498**	0.309**	1		
Q8	0.563**	0.480**	0.390**	0.281**	0.281**	0.264**	0.392**	1	
Q9	0.316**	0.509**	0.488**	0.117	0.269**	0.220**	0.305**	0.434**	1

Sig. *$p < 0.05$, **$p < 0.001$

Thus, it might be concluded that knowledge transfer and good practice, digitalization, and the use of renewable energy may encourage companies to develop new products or introduce innovation in the context of the circular economy.

DISCUSSION AND CONCLUSIONS

The transition to a circular economy necessitates systemic changes, including legislative support and educational initiatives to raise awareness and understanding of CE concepts among stakeholders. Educational institutions are important in this transformation by collaborating with the business companies. Additionally, collaboration among various sectors, including academia, industry, and government, is essential to develop effective strategies for implementing circular economy practices. The research proved that companies tend to collaborate with each other and are involved in the networks for developing innovations. Additionally, Nordic capital companies have a positive attitude towards the transition from a linear to a circular economy business model. One-fifth of the companies confirmed that they created and implemented social innovation. Meanwhile, most of the companies agree that knowledge transfer/assimilation is significant for transfer to a circular economy. Especially, companies emphasized the importance of sharing experiences and good practices. This explains, why some companies tend to participate in collaborative networks. Although, the number is low. Further, digitalization makes a huge impact on the transfer to a circular economy. These results are in line with Gonzalez-Dominguez et al. (2020), who confirmed that collaborative projects and sharing knowledge are beneficial in developing eco-innovations and transferring to a circular economy.

Theoretical implications: The results of the research are interdisciplinary and contribute to the theory of knowledge transfer and the concept of circular economy while providing interlinkages between these two theories.

Limitation and future research: The research was limited and targeted a very small number of companies, focusing on Nordic capital companies. Meanwhile, replicated results on different capital companies or specific business sectors might provide different results.

REFERENCES

Agustí, M. A., Ramos-Hidalgo, E., Moreno-Menéndez, A. M. (2022). The role of international knowledge acquisition and absorptive capacity as a predictor of international performance. *Canadian Journal of Administrative Sciences*, *39*(1), 81–96. https://doi.org/10.1002/cjas.1651

Avikal, S., Nigam, M., & Ram, M. (2021). A hybrid multi criteria decision making approach for consultant selection problem in ERP project. *International Journal of System Assurance Engineering and Management*, 13(S2), 941–950. https://doi.org/10.1007/s13198-021-01505

Awan, U., Kanwal, N., Bhutta, M. K. S. (2020). A Literature Analysis of Definitions for a Circular Economy. In Golinska-Dawson, P. (eds) *Logistics Operations and Management for Recycling and Reuse*, (pp. 19–34). https://doi.org./10.1007/978-3-642-33857-1_2

Camacho-Otero, J., Boks, C., & Pettersen, I. N. (2018). Consumption in the circular economy: a literature review. *Sustainability*, *10*(8), 2758. https://doi.org/10.3390/su10082758

De Jesus, A., Mendonca, S. (2018). Lost in Transition? Drivers and Barriers in the Eco-Innovation Road to the Circular Economy. Ecological Economics, 145, 75–89. https://doi.org/10.1016/j.ecolecon.2017.08.001

Gechbaia, B., Maisuradze, T., Paresashvili, N., Goletiani, K., & Gvarishvili, L. (2023). Challenges and barriers in transition to circular economy business models. *E3S Web of Conferences*, *408*, 01016. https://doi.org/10.1051/e3sconf/202340801016

Gómez-Zaldívar, M., Llamosas-Rosas, I., F Gómez-Zaldívar, F., (2021). The relationship between economic complexity and the pattern of foreign direct investment flows among Mexican states. *The Review of Regional Studies*, *51*(1), 64–88 https://doi.org/10.52324/001c.21211

Govindan, K., & Hasanagic, M. (2018). A systematic review on drivers, barriers, and practices towards circular economy: a supply chain perspective. *International Journal of Production Research*, *56*(1–2), 278–311. https://doi.org/10.1080/00207543.2017.1402141

Gusmerotti, N. M., Testa, F., Corsini, F., Pretner, G., Iraldo, F. (2019). Drivers and approaches to the circular economy in manufacturing firms. *Journal of Cleaner Production*, *230*, 314–327, https://doi.org/10.1016/j.jclepro.2019.05.044

Holmström, L. C., Kang, O., Ljung, A., & Rosenbaum, P. (2022). Involvement of multinational corporations in social innovation: Exploring an emerging phenomenon. *Journal of Business Research*, *151*, 207–221. https://doi.org./10.1016/j.jbusres.2022.07.003

Holly, F., Kolar, G., Berger, M., Fink, S., Ogonowski, P., & Schlund, S. (2023). Challenges on the way to a circular economy from the perspective of the Austrian manufacturing industry. *Frontiers in Sustainability*, *4*, 1243374. https://doi.org/10.3389/frsus.2023.1243374

Kirchherr, J., Piscicelli, L., Bour, R., Kostense-Smit, E., Muller, J., Huibrechtse-Truijens, A., Hekkert, M. (2018). Barriers to the Circular Economy: Evidence from the European Union (EU). *Ecological Economics*, *150*, 264–272. https://doi.org/10.1016/j.ecolecon.2018.04.028

Koszewska, M. (2018). Circular Economy – Challenges for the Textile and Clothing Industry. *Autex Research Journal*, *18*(4), 337–347. https://doi.org/10.1515/aut-2018-0023

Kuzma, E. L., Sehnem, S., Lopes de Sousa Jabbour, A. B. & Campos, L. M. S. (2022). Circular economy indicators and levels of innovation: an innovative systematic literature review. *International Journal of Productivity and Performance Management*, *71*(3), 952–980. https://doi.org/10.1108/IJPPM-10-2020-0549

Lahti, T., Wincent, J., & Parida, V. (2018). A definition and theoretical review of the circular economy, value creation, and sustainable business models: where are we now and where should research move in the future? *Sustainability*, *10*(8), 2799. https://doi.org/10.3390/su10082799

Li, Y., Hu, Y., Li, L., Zheng, J., Yin, Y., & Fu, S. (2023). Drivers and outcomes of circular economy implementation: evidence from China. *Industrial Management & Data Systems*, *123*(4), 1178–1197. https://doi.org/10.1108/IMDS-05-2022-0267

MacArthur, E. (2013). Towards the circular economy. *Journal of Industrial Ecology*, *2*(1), 23–44.

Maldonado-Guzmán, G., Garza-Reyes, J. A., Pinzón-Castro, S. Y., & Kumar, V. (2020). Innovation capabilities and performance: Are they truly linked in SMEs? *International Journal of Innovation Science*, *11*(1), 48–62. https://doi.org/10.1108/IJIS-12-2017-0139

Nwagu, N. B., & Enofe, E. E. (2021). The Impact of Entrepreneurship on the Economic Growth of an Economy: An Overview. *Journal of Emerging Trends in Economics and Management Sciences* (JETEMS), *12*(4),143–149.

Okorie, O., Salonitis, K., Charnley, F., Moreno, M., Turner, C., & Tiwari, A. (2018). Digitisation and the Circular Economy: A Review of Current Research and Future Trends. *Energies*, *11*(11), 3009. https://doi.org/10.3390/en11113009

Osterman, J., Aizen, M. A., Biesmeijer, J. C., Bosch, J., Howlett, B. G., Inouye, D. W., Jung, C., Dino Martins, D. J., Medel, R., Pauw, A., Seymour, C. L., & Paxton, R. J. (2021). Global trends in the number and diversity of managed pollinator species. *Agriculture, Ecosystems & Environment*, *322*, 107653. https://doi.org/10.1016/j.agee.2021.107653

Ozili, P. K. (2022). Sustainability and Sustainable Development Research around the World. *Managing Global Transitions*, *20*(3), 259–293. https://doi.org./10.26493/1854-6935.20.259-293

Poponi, S., Arcese, G., Pacchera, F., & Martucci, O. (2022). Evaluating the transition to the circular economy in the agri-food sector: Selection of indicators. *Resources, Conservation and Recycling*, *176*, 105916. https://doi.org/10.1016/j.resconrec.2021.105916.

Rizos, V., Behrens, A., Van Der Gaast, W., Hofman, E., Ioannou, A., Kafyeke, T., Flamos, A., Rinaldi, R., Papadelis, S., Hirschnitz-Garbers, M., & Topi, C. (2016). Implementation of Circular Economy Business Models by Small and Medium-Sized Enterprises (SMES): Barriers and enablers. *Sustainability*, *8*(11), 1212. https://doi.org/10.3390/su8111212

Saarinen, A., & Aarikka-Stenroos, L. (2022). Financing-Related Drivers and Barriers for Circular Economy Business: Developing a Conceptual Model from a Field Study. *Circular Economy and Sustainability*, *3*, 1187–1211. https://doi.org/10.1007/s43615-022-00222-5

Santos, M. R. C., Rolo, A., Matos, D. S. d., & Carvalho, L. C. (2023). The circular economy in corporate reporting: text mining of energy companies' management reports. *Energies*, *16*(15), 5791. https://doi.org/10.3390/en16155791

Sawe, F., Kumar, A., Garza-Reyes, J. A., & Agrawal, R. (2021). Assessing people-driven factors for circular economy practices in small and medium-sized enterprise supply chains: business strategies and environmental perspectives. *Business Strategy and the Environment*, *30*(7), 2951–2965. https://doi.org/10.1002/bse.2781

Sehnem, S., Lara, A. C., & Benetti, K. (2023). Improving startups through excellence initiatives: addressing circular economy and innovation. *Environment, Development and Sustainability*, *26*, 15237–15283. https://doi.org/10.1007/s10668-023-03247-4

Silajdzic, S., & Mehic, E. (2015). Knowledge Spillovers, Absorptive Capacities and the Impact of FDI on Economic Growth: Empirical Evidence from Transition Economies. *Procedia - Social and Behavioral Sciences*, *195*, 614–623. https://doi.org/10.1016/j.sbspro.2015.06.142

Suzanne, E., Absi, N., & Borodin, V. (2020). Towards circular economy in production planning: Challenges and opportunities. *European Journal of Operational Research*, *287*(1), 168–190. https://doi.org/10.1016/j.ejor.2020.04.043

Szilagyi, A., Cioca, L., Bacali, L., Lakatos, E. S., & Bîrgovan, A. L. (2022). Consumers in the circular economy: a path analysis of the underlying factors of purchasing behaviour. *International Journal of Environmental Research and Public Health*, *19*(18), 11333. https://doi.org/10.3390/ijerph191811333

Yousaf, I., Nekhili, R., & Umar, M. (2022). Extreme connectedness between renewable energy tokens and fossil fuel markets. *Energy Economics*, *114*, 106305. https://doi.org/10.1016/j.eneco.2022.106305

AUTHORS' SHORT BIOGRAPHY

Agnė Šimelytė is an Associate Professor at Vilnius Gediminas Technical University. Her research interests cover FDI, economic growth, innovation, and sustainable development. She holds a PhD in Management from Vilnius Gediminas Technical University. She is the author or co-author of more than 30 scientific articles, two handbooks, and two monographs. In 2012, she received the award for the best scientific research of PhD students, and in 2013, she received a promotional scholarship for doctoral candidates from the Research Council of Lithuania. A. Šimelytė gives lectures for bachelor and master students. Agnė Šimelytė has participated in the following projects financed by the European Union: 7th framework program (Marie Curie), International Research Staff Exchange Scheme (IRSES) FP7-PEOPLE-2012-IRSES, Grant Agreement Number 319017 SHuMED (2013-2015).
E-mail: agne.simelyte@vilniustech.lt