

ALIGNMENT OF CIRCULAR ECONOMY BUSINESS MODELS FOR FRAMING NATIONAL  
SUSTAINABLE ECONOMIC DEVELOPMENT

***Dzintra Atstaja***

Department of Law, Rīga Stradiņš University, Latvia  
Department of Management, BA School of Business and Finance, Latvia  
dzintra.atstaja@ba.lv

 <https://orcid.org/0000-0002-9411-7212>

***Natalija Cudecka-Purina***

Department of Management, BA School of Business and Finance, Latvia  
natalija.cudecka-purina@ba.lv

 <https://orcid.org/0000-0002-5736-7730>

***Raisa Hrinchenko***

Department of Economy of Enterprise and Organization of Entrepreneur Activity  
Odessa National Economic University, Ukraine, raya11@ukr.net

 <https://orcid.org/0000-0002-3366-6154>

***Viktor Koval***

National Academy of Sciences of Ukraine, Ukraine  
victor-koval@ukr.net

 <https://orcid.org/0000-0003-2562-4373>

***Janis Grasis***

Department of Law, Rīga Stradiņš University, Latvia  
Department of Management, BA School of Business and Finance, Latvia  
janis.grasis@rsu.lv

 <https://orcid.org/0000-0002-1394-9958>

***Rudite Vesere***

Riga Technical University, Latvia, ruditevesere@yahoo.com

 <https://orcid.org/0000-0002-5023-402X>

*Article history: Received 18 October 2021, Received in revised form 30 October 2021, Accepted 25 November 2021, Available online 26 November 2021*

**Abstract**

Circular economy offers opportunities to boost jobs and tackle climate change. The article reflects aspects of the impact on the environment through sectoral policies to support the circular economy because current business as usual model, based on the linear economy principle leads to a staggering inefficiency in nature resources are managed, with increased pollution, loss of ecosystems and substantial losses of value with each product disposed. This requires a change not only in consumer behaviour but even more on the resource extraction and material production side. The purpose of the research paper is to develop a decision-making matrix providing a step-by-step approach for the policymakers.

**Keywords**

business models; circular economy; systems dynamics; sustainability.

**Introduction**

As the economy experiences significant boost, which will be such also in the long run, more and more primary materials for the production purposes are required and they inevitably have a significant impact on waste generation. There is no problem if the economy is relatively small compared to the natural ecosystem. But it is

essential to keep in mind that natural ecosystem is simultaneously the source of raw materials and the final disposal for human-produced wastes. Although the result of non-rational resource consumption determines the need for increased opportunities for the implementation and expansion of recycling and reuse of products, especially in developing countries with a high population density [1–4]. All this is describing the business-as-usual model, which has been applied worldwide in the 20<sup>th</sup> and 21<sup>st</sup> centuries and can be defined as linear economy. The core of the linear economy is the chain of "resource extraction - production - use - profit making - waste management at a lower cost," which has led to increase of short-life span use products with considerably low percentage of recycling.

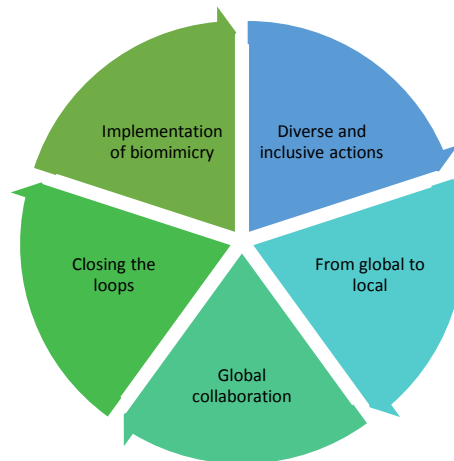


Figure 1. Steps to minimise the circularity gap.

Building a global coalition for action that is both diverse and inclusive, will bring together business, governments, NGOs and scientists to boost capacity to serve societal needs and to solve problems more sustainably. By closing the loops, it will be possible to monitor the resource flow and to identify the recycling or industrial symbiosis opportunities [5–8]. Implementation of biomimicry allows assessing nature not for consumption purposes, in terms of what can be extracted, harvested or domesticated, but for learning and optimising in production processes.

#### The theoretical framework

The circular economy approach is based on a system of production, distribution of consumption, reuse, recycling in order to save the cost of products and minimize the generation of waste to reduce the burden on the environment through the 3R (Reduce-Reuse-Recycle) Concept [9–12]. The circular theory uses different models that can be used within their functional purpose. The need to develop a national model of a circular economy is linked closely with the specifics and strategy of transition from a linear economy with appropriate financial incentive measures to achieve environmental criteria in all areas of production. Pollin, et.al. [13] investigated the conditions for such a shift from linear to circular economy that can be developed and implemented within the green recovery package.

The development of a natural ecosystem in terms of rational resource consumption, recycling and reuse of products as new business models has been identified and analysed [2,4,7,14]. Obviously, transition to a circular economy is not possible without the support of the authorities at the national, regional and municipal level, which can be implemented through sectoral policies to finance waste minimisation and recycling [15]. Increasing the efficiency of consumption of natural resources is possible with the technological modernization of the economy, the transition to higher technological structures and the improvement of legal regulation of the circular economy [16].

The circular economy is a field of emerging research, and up to now, the focus has mostly been on materials and the circularity aspects of the companies [17–19] investigated the transition to circular economy in order to reduce the overall anthropogenic load of the economy on the environment. This approach considers the linkages within and between sectors / value chains.

According to Scarpellini et.al. [20], circular economy-related activities introduced by businesses are influenced by the analysed capabilities that also improve the environmental and financial performance of firms in a circular economy framework. Moreover, the researchers show the mediating role of stakeholders in introducing

the circular economy in businesses, which is a little explored line of inquiry, as this relationship has not been widely analysed for the circular economy. When analysing the theoretical framework trends, it can be clearly noted that research on circular economy generally focused on the production aspects, paying less attention to consumer behaviour and demand [21].

It has been identified, that sustainable business models are able to provide and sustain environmental, societal, and economic value [22–24]. Circular business models are aimed at identifying and assessing the logic of creating circular infrastructure [25]. In addition to that, they tend to focus on resource efficiency strategies in order to develop more sustainable production and consumption patterns [26].

### Methods

Studies have shown that the development of a marketing strategy for an enterprise is carried out according to almost the same scheme (Figure 4). However, the study showed that customers had changed dramatically: first, they are interested in a personal attitude, and only then in the quality of goods, price – the usual indicators that have always been in the first places.

Thus, we believe that the main goal of a marketing strategy for an enterprise's financial growth is to ensure customer loyalty, i.e., customer focus.

### Results

It has been identified that both governmental and non-governmental organizations increasingly encourage the businesses for the transition towards a circular economy. The EU Action Plan has been strengthened by revising the waste package directives, which has succeeded in 2018, altogether forming the Circular Economy Package with the aim of developing the circular economy through the creation of various platforms, offering funding from the Cohesion Fund [15,27].

The main outcome of the strategies is to implement the paradigm from linear to a circular economic model. Establishing this kind of a shift is a complex task which requires substantial changes in habits and practices in many fields of society[28]. This leads to a conclusion, that each strategy is able to define different objectives in relation to the general aim.

It is very important that for the Stakeholders there is a possibility provided to communicate and share experiences and best practices via the European Circular Economy Stakeholder Platform. This platform was established in 2017 by the European Commission and the European Economic and Social Committee with the main aim to enhance the circular economy both across territories, industries and communities by bringing together experts and providing possibilities to share knowledge and foster dialogue [29].

The latest reports by European Commission reveal that in 2019 there were already over 30 Circular economy strategies in place, both of national and/or regional levels. Despite the level the key concept of the strategies is to contribute to the so-called paradigm shift of moving from the linear towards a more circular economic model. Establishing this type of a shift is a complex goal requiring fundamental changes in consumer behavior and habits in many subsystems of society.

The transition to a CE requires systemic change and a holistic, integrated approach that takes into account links within and between sectors, within and across value chains and between civil society and industrial stakeholders [18].

It is important to understand that circular economy can be applied by an entity by adoption of certain business model, or by transformation of existing activities or business elements. Below the authors have summarized the business aspects that can be improved by implementation of circular economy aspects.

#### Types of Circular economy business models.

The use of different business models allows you to minimize the consumption of materials and resources for production, as well as complete the life cycle of products through further processing and are based on:

- circular supply models. These substitute materials from primary resources with renewable, bio-based, or recovered materials, in this way reducing demand for primary resource extraction.
- resource recovery/regaining models focus on recycling waste into secondary materials (or secondary raw materials), consequently, diverting waste from landfill and in addition decreasing the volume of extraction of primary resources.
- product lifetime extension models. Focus on extending the consumption period of products, slowing the flow of materials in the economy and reduce the rate of primary resource extraction, consumption, and waste generation.
- sharing models. Tend to facilitate the sharing of goods, and can therefore reduce demand for new

products, optimize use of products already owned by the end-user and reduce the consumption of primary natural resources.

- product service system models. It is where services, not products are placed on the market, thus improving stimulus for green product design and more effective product use, thus contributing a more sustainable use of primary resources [30–32].

Table 1. Summary of actions, that may be implemented in different entity's divisions.

Source: based on [4,5,14–23,6,24–29,33,7–13].

Entity division	Improvements to be undertaken
Human resources	organizational culture oriented towards recycling, reuse; training and improvement of the personnel consumer behaviour, in line with circular economy
Logistics	closing the loops; implementation of reverse logistics;
Research and Development	Reduce consumption of non-renewable primary resources; increase consumption of renewable primary resources; reduce carbon emissions; reduce waste; implementing internet of things
Production	developing products with a longer life cycle; developing products suitable for reuse, remanufacturing; optimization of production equipment; implementation of industrial symbiosis; extension of technical quality control
Sales and After-sales	improving consumer relations; developing cooperation, transparency between stakeholders; after-sales services; increasing producer responsibility for ineffective use of primary resources, environmental pollution
Financial sector	identifying and optimising environmental costs; implementing accounting in accordance with the circular economy; retaining economic value of the materials

Following table shows a summary of most popular circular economy business models, as well as highlight types of resource efficiency, business model sub-types and reveals sectors, which are already implementing circular economy business models. For instance, circular value chain stands for reduced consumption of primary resources in production and uses renewable, recycled or recyclable materials. Material recovery and industrial symbiosis - tracks and recovers products before they become waste, enhances effective use of by – products and is focused on recycling up-cycling and down-cycling. Product durability, repair is focused on product life cycle extension and development of "dismantling design" at the design stage.

Personalization and tailor-made design – offer building long-term relationships with the client, promotes loyalty, makes it easier to develop repair, material recovery and recycling, and last, but not least - stands against overstocking. Product service system, dematerialization of services – grants access to a service, not to the goods themselves and it shifts the mindset from owning to using products. And finally – sharing economy – means that citizens have more opportunities to rent, lease, share, exchange or lend goods. It does help in optimization of the production rates and offers a variety of platforms for product sharing, exchange or lease.

When analyzing types of product services, three main types can be identified. Product-oriented: the business model is focused on sales of products. Some extra services can be added, as for example maintenance services. Use-oriented: The product still is a key player; it is owned by a producer-company and is offered to a customer.

The idea behind this category is to provide access to the product for the user. Result-oriented: The customer and service provider agree on a result. Normally there is no pre-determined product involved. This is also referred to as a "performance" model [34–36].

The Figure 2 depicts three different categories of product-service business models:

- product-oriented: the business model is focused on sales of products but with additional services for instance, a maintenance contract
- use-oriented: The product still plays a central role. It is owned by a provider but is being made available to the client. This is also referred to as an "access" model. Basically, it grants consumer access to the functionality of the product, when required by consumer.
- result-oriented: The consumer and provider agree on an outcome, within this business model, the product, delivering the outcome is not much important for the consumer. This is also referred to as a "performance" model [24].

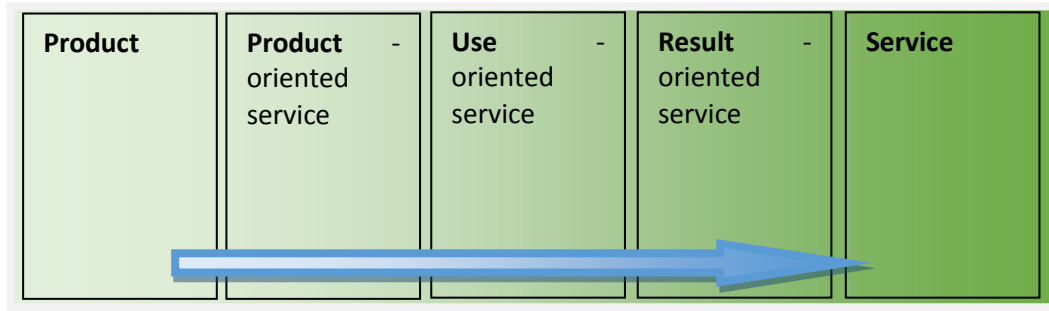


Figure 2. Transition from Products to services in circular economy.

This will be one of the most important tasks for the entities in the nearest future – to identify their status-quo and to understand transition towards what direction would be most appropriate, sustainable and economically efficient for the company.

#### Decision-making process.

In order to be able to assess all the aspects of the business environment and the entity, it is important to analyze the influential factors, the limitations and the particular required data for each company or business sector [37–39]. According to the abovementioned, the authors have developed an information flow for decision-making process for assessment of transition to circular economy and for choice of best appropriate business model, which is presented in the Figure 4.

Regulatory changes in many cases are seen as keys to unlock the existing circularity potential. Legislative boundaries can add a positive impact to the value chains and encourage cooperation between different economic sectors that might have not evaluated this cooperation possibility beforehand. In some cases, it is related to technical issues that affect material flows in different sectors, especially here comes the issue of the legal definition of waste and certain waste treatment obligations.

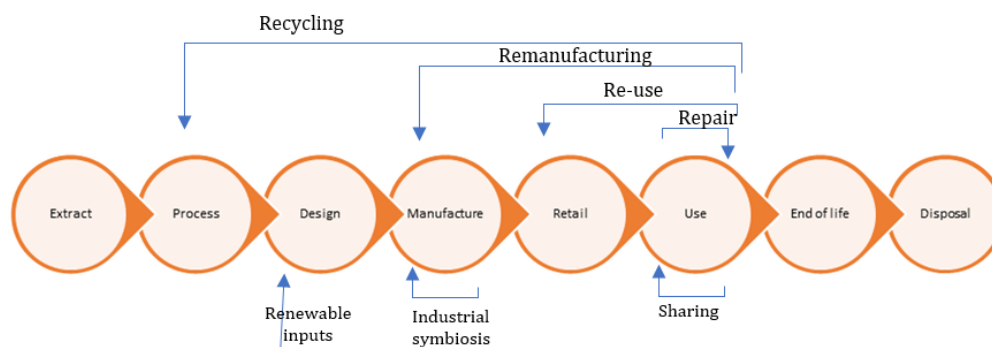


Figure 3. The impact of circular economy on linear business processes. *Source [40].*

This type of examples mostly requires actions to be taken on national or European level. A discussion of regulation framework in circular economy strategies may concern advocacy, rather than direct legislative innovation.

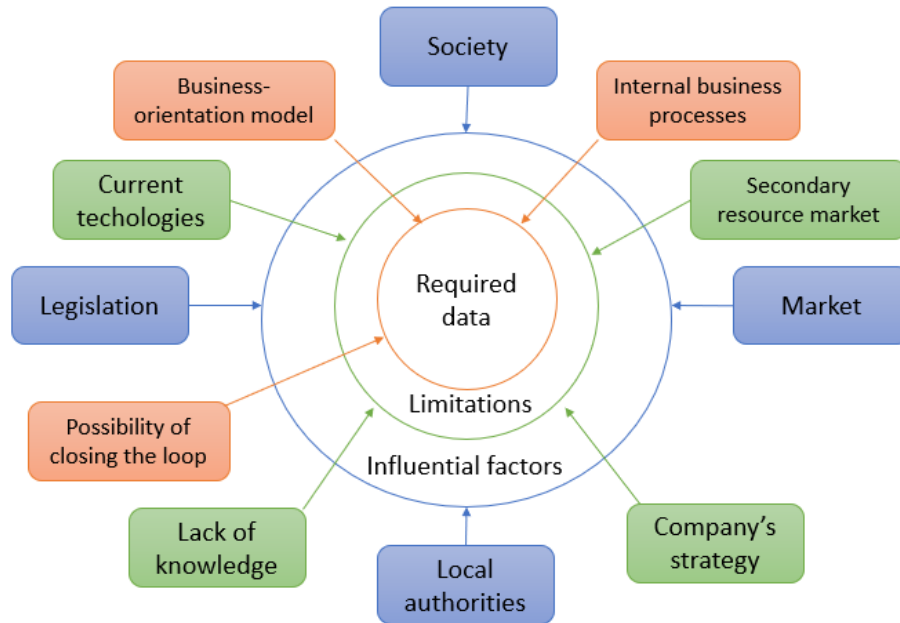


Figure 4. Information flow for decision-making process.

#### Assessment of business values and closed-loop approach.

In this section, the authors would like to tackle the importance of the closed-loop, identifying it a bit broader than solely on a company-scale. The figure below depicts three main basic principles for a company/region/State economy to implement the closed-loop concept.

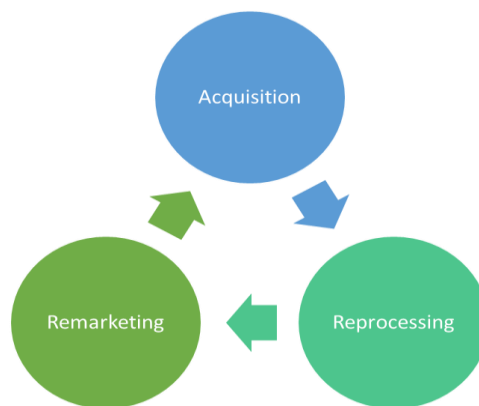


Figure 5. The main business processes for closed-loop system.

First step is acquisition. It means that one needs to develop a collection system to collect the right volumes of materials or products of the right quality, for a competitive price.

Second step is reprocessing. At this stage refurbishment, remanufacturing or recycling of used products or materials, for a competitive price has to take place.

Third step is remarketing. Finally, one requires to identify markets that would be ready to purchase the reprocessed products or materials.

Here the utmost importance is to have the comprehension that in case any of these steps fails, the closed loop is not there anymore.

Since the circular economy highlights the importance of value creation for all stakeholders, this is a very important perspective to take. Based on an examination of value, the parties involved can develop a model for the optimization of common value creation [41–43]. After undertaking an extensive literature research, the

authors have gathered business values that can be obtained from the implementation of closed loop principle (Table 2).

Table 2. Assessment of circular economy business values. *Source: based on Vijayan, et. al. [43] Camilleri [44].*

Type of value	Description
Sourcing value	Direct cost reductions and savings that can arise from closed loop business practices
Environmental value	Benefits that result from improved ecological footprints, i.e. ease of compliance and improved green image
Customer value	Increased customer loyalty, better customer satisfaction and superior brand protection
Informational value	Closing the loop generates valuable data on production and supply problems, failure rates, useful lifetime of the product and usage patterns.

#### Matrix for circular economy strategy of a country's economy.

As a result of the research, the authors offer a step-by-step matrix for development of a tailor-made circular economy strategy for a country's economy. Main key points of the matrix are – to assess the stakeholders at the following stages: material extraction, material processing, product design, manufacturing, distribution, repair, refurbishment, remanufacturing, waste management. It should then be followed by development of key stakeholder working group (KSWG).

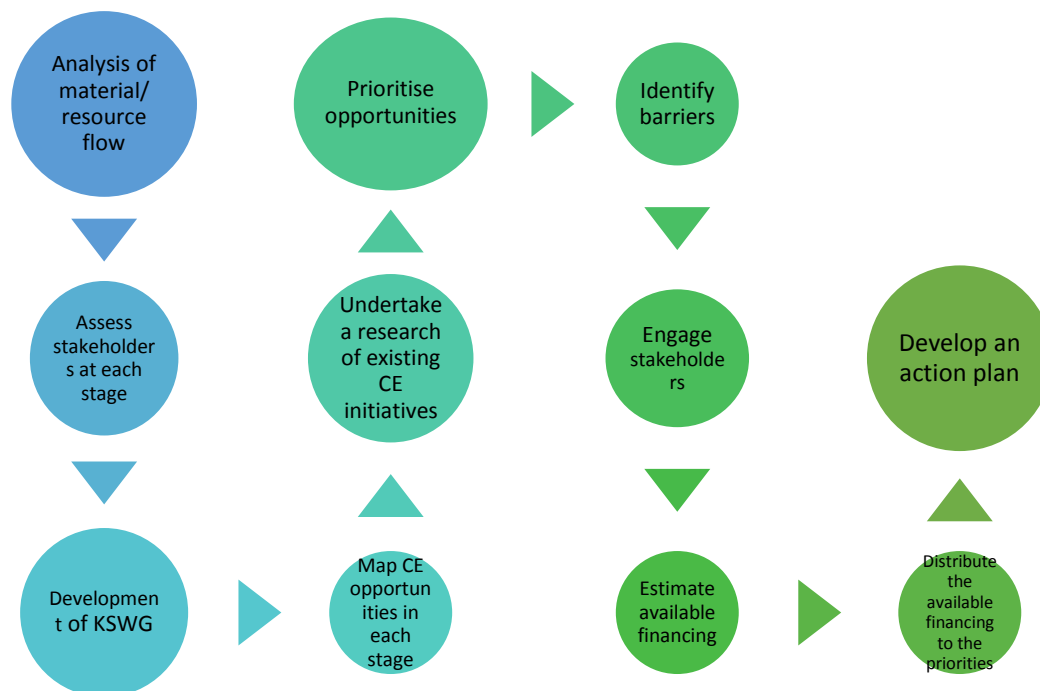


Figure 6. Circular economy action plan development matrix.

This working group then will have a range of very important obligations. One would be thorough assessment of each economy field in order to identify the best practices in the circular economy that are already in place [44–46].

Another – wise and sustainable distribution of allocated financing to the priority stages. As a result of the KSWG work, an action plan will be developed. Further it is of vital importance to hold a range of seminars for the stakeholders and industry to communicate on the priorities, financing available and required compliance criteria.

The circular economy can be an important lever to achieve key policy objectives such as generating economic growth, creating jobs, and reducing environmental impact. Multiple studies have already demonstrated how the circular economy can contribute at a national, regional and supranational level to objectives such as generating economic growth, creating jobs, and reducing environmental impact [47]. While using different methodologies and performed on different sectoral and geographical scopes, these studies have consistently demonstrated the positive impacts of the circular economy: growing GDP by 0.8–7%, adding 0.2–3.0% jobs, and reducing carbon emissions by 8–70%.

### **Impact**

The necessity to shift to circular economy can be boosted when the entities would be shown the possible business models and the way one or another company might apply them on practice. The purpose of the research paper is to develop a decision-making matrix providing a step-by-step approach for the policymakers. This tool would allow identifying the best suitable circular economy business model for Latvia's economy in general – i.e., which direction of the circular economy should be given more support on the state level. The methods used in the paper will be economic assessment, secondary data analysis and systems dynamics for decision-making. The research is limited to analysis of circular economy examples in Latvia. One of the main findings as well as practical implication will be a tool for decision-making basing on authors developed circular economy business model choice matrix. The research will be of a value for entrepreneurs, working with the focus on the circular economy alongside for policymakers, to identify the sectors of economics with the higher potential for transition to circular economy. The paper is designed as a research paper. These studies are the blueprints to prove the environmental and social impact of circular economy. Apart from this the positive impact of a circular economy on GDP growth, job creation and carbon reduction, there are also cost savings and increased reuse and recycling of materials through reduced demand for primary materials.

### **Conclusions**

Basing on the undertaken research, the authors have developed the following conclusions.

The concept of circular business models is seen as a strong enabler for companies that are willing to move forward circular practices. However, it has to be understood that designing business models in line with circular economy principles and capitalising the environmental and economic values of a company or a product lead to development of a new set of requirements for business model innovation. Business models need to be designed in a way that enable preservation and utilisation of the value embedded in resources (e.g. through resource recovery, long life, multiple use cycles) if resource loops are to be slowed and closed.

As a result of this research the authors have developed a matrix for circular economy strategy of a country's economy. By applying this step-by-step approach, policymakers will be able to develop most inclusive action plan, that will assess and take into consideration all the fields of economy tackled by circular economy, it will identify already existing circular economy initiatives and prioritise the opportunities at each of the circular economy stages.

### Further research

Further research would be linked with practical development of part of the action plan matrix, by assessing stakeholders at each stage of circular economy, developing the opportunities and identifying the barriers to the implementation of circular economy.

It is of interest for the authors to undertake further research and to assess the resource cycle within a company, to develop cost comparison, with and without implementation of circular economy elements. In this case it would be assessment of implementation of industrial symbiosis.

### **Conflict of interest**

There are no conflicts to declare.

### **Acknowledgements**

This research was funded within the Fundamental applied research project “Quadruple Helix Concept (QHC) as a base of the next generation PPP model” (no. lzp-2020/1-0062) by the Latvian Council of Science (Latvia).

### **References**

- [1] D. Atstaja, I. Uvarova, D. Kamilla Kambala, V. Alberte, K. Stokmane, A. Gegere-Zetterstroma, S. Kraze, G. Zapletnuka, Investments to Develop Business Models and Projects in the Circular Economy, in: IOP



- Conf. Ser. Earth Environ. Sci., 2020. <https://doi.org/10.1088/1755-1315/578/1/012029>.
- [2] A. Druckman, M. Chitnis, S. Sorrell, T. Jackson, Missing carbon reductions? Exploring rebound and backfire effects in UK households, *Energy Policy*. 39 (2011) 3572. <https://doi.org/10.1016/j.enpol.2011.03.058>.
- [3] O. V. Prokopenko, Consumer choice types in marketing of ecological innovations, *Actual Probl. Econ.* 116 (2011) 109–116.
- [4] S. Sehnem, D. Vazquez-Brust, S.C.F. Pereira, L.M.S. Campos, Circular economy: benefits, impacts and overlapping, *Supply Chain Manag.* 24 (2019) 784–804. <https://doi.org/10.1108/SCM-06-2018-0213>.
- [5] C. Schmidt, G. Van Gebin, F. Van Houten, C. Close, D.B. McGinty, R. Arora, J. Potocnik, N. Ishii, P. Bakker, M. Kituyi, F. Sijbesma, A. Wijkman, The Circularity Gap Report 2020, *Circ. Econ.* 3 (2020) 69. <https://www.circularity-gap.world/about>.
- [6] European Commission, A new Circular Economy Action Plan, (2020).
- [7] A. Constantin, D. Mihaela, D. , Mihaela, Business Model in Circular Economy, *Valahian J. Econ. Stud.* 8 (2017) 101–108.
- [8] I. Uvarova, D. Atstaja, U. Grinbergs, J. Petersons, A. Gegere-Zetterstroma, S. Kraze, Transition to the circular economy and new circular business models - An in-depth study of the whey recycling, in: IOP Conf. Ser. Earth Environ. Sci., 2020: p. 012019. <https://doi.org/10.1088/1755-1315/578/1/012019>.
- [9] E. MacArthur, Towards the Circular Economy vol. I and vol. II Economic and business rationale for a circular economy, *Ellen MacArthur Found.* 1,2 (2012).
- [10] European Environment Agency, Signals: well-being and the environment—building a resource-efficient and circular economy in Europe Luxembourg, Publ. Off. Eur. Union, Copenhagen, Denmark. (2014).
- [11] Y. Lazarenko, O. Garafonova, V. Marhasova, S. Grigashkina, O. Kozureva, The managerial aspects of integrating the sustainable development principles into practices of mining companies, in: A. Khoreshok, V. Atrushkevich, S. Vöth, D. Nuray, J. Janocko, Y. Tan, D. Marasová, P. Stefanek, M. Petrova (Eds.), *E3S Web Conf.*, 2019: p. 03011. <https://doi.org/10.1051/e3sconf/201913403011>.
- [12] A. Pinchuk, N. Tkalenko, V. Marhasova, Implementation of circular economy elements in the mining regions, in: M. Tyulenev, S. Zhironkin, A. Khoreshok, S. Vöth, M. Cehlár, D. Nuray, J. Janocko, S. Anyona, Y. Tan, A. Abay, D. Marasová, P. Stefanek (Eds.), *E3S Web Conf.*, 2019: p. 04048. <https://doi.org/10.1051/e3sconf/201910504048>.
- [13] R. Pollin, H. Garrett-Peltier, J. Heintz, H. Scharber, “Green Recovery: a program to create good jobs and start building a low-carbon economy,” *Cent. Am. Prog.* 1 (2008) 1–36.
- [14] O. Prokopenko, L. Korchevska, M. Shulga, A. Zakharchenko, T. Staverska, Y. Sydorov, Adaptation of the development of ecological entrepreneurship, *Int. J. Sci. Technol. Res.* 9 (2020) 1112–1115.
- [15] G. Salvatori, F. Holstein, K. Böhme, Circular economy strategies and roadmaps in Europe: Identifying synergies and the potential for cooperation and alliance building, 2019. <https://www.eesc.europa.eu/sites/default/files/files/qe-01-19-425-en-n.pdf>.
- [16] M. Smol, The importance of sustainable phosphorus management in the circular economy (CE) model: the Polish case study, *J. Mater. Cycles Waste Manag.* 21 (2019) 227–238. <https://doi.org/10.1007/s10163-018-0794-6>.
- [17] E. Guldman, R.D. Huulgaard, Barriers to circular business model innovation: A multiple-case study, *J. Clean. Prod.* 243 (2020) 118160. <https://doi.org/10.1016/j.jclepro.2019.118160>.
- [18] F. Boons, C. Montalvo, J. Quist, M. Wagner, Sustainable innovation, business models and economic performance: An overview, *J. Clean. Prod.* 45 (2013) 1–8. <https://doi.org/10.1016/j.jclepro.2012.08.013>.
- [19] K. Whalen, Classifying circular business models: a practice-based review, *Conf. Proc.* (2017) 417–421.
- [20] S. Scarpellini, L.M. Marín-Vinuesa, A. Aranda-Usón, P. Portillo-Tarragona, Dynamic capabilities and environmental accounting for the circular economy in businesses, *Sustain. Accounting, Manag. Policy J.* 11 (2020) 1129–1158. <https://doi.org/10.1108/SAMPJ-04-2019-0150>.
- [21] R. Elzinga, D. Reike, S.O. Negro, W.P.C. Boon, Consumer acceptance of circular business models, *J. Clean. Prod.* 254 (2020) 119988. <https://doi.org/10.1016/j.jclepro.2020.119988>.
- [22] S. Evans, D. Vladimirova, M. Holgado, K. Van Fossen, M. Yang, E.A. Silva, C.Y. Barlow, Business Model Innovation for Sustainability: Towards a Unified Perspective for Creation of Sustainable Business Models, *Bus. Strateg. Environ.* 26 (2017) 597–608. <https://doi.org/10.1002/bse.1939>.
- [23] F. Lüdeke-Freund, S. Gold, N.M.P. Bocken, A Review and Typology of Circular Economy Business Model Patterns, *J. Ind. Ecol.* 23 (2019) 36–61. <https://doi.org/10.1111/jiec.12763>.
- [24] L. Schmerber, Circular business models for SMEs, (2020).
- [25] M. Antikainen, K. Valkokari, A Framework for Sustainable Circular Business Model Innovation, *Technol.*

- Innov. Manag. Rev. 6 (2016) 5–12. <https://doi.org/10.22215/timreview1000>.
- [26] J.L.K. Nußholz, A circular business model mapping tool for creating value from prolonged product lifetime and closed material loops, *J. Clean. Prod.* 197 (2018) 185–194. <https://doi.org/10.1016/j.jclepro.2018.06.112>.
- [27] E. Commission, Implementation of the Circular Economy Action Plan, (2018).
- [28] European Commission, Scoping study to identify potential circular economy actions, priority sectors, material flows and value chains - Environment policy and protection of the environment - EU Bookshop, Luxembourg, 2014. <http://bookshop.europa.eu/en/scoping-study-to-identify-potential-circular-economy-actions-priority-sectors-material-flows-and-value-chains-pbKH0114775/>.
- [29] 2017, European Circular Economy Stakeholder Platform, <https://circulareconomy.europa.eu/platform/>.
- [30] B. Mentink, Masterarbeit: Circular Business Model Innovation: A process framework and a tool for business model innovation in a circular economy, Delft Univ. Technol. (2014) 168. [http://repository.tudelft.nl/assets/uuid:c2554c91-8aaf-4fdd-91b7-4ca08e8ea621/THESIS\\_REPORT\\_FINAL\\_Bas\\_Mentink.pdf](http://repository.tudelft.nl/assets/uuid:c2554c91-8aaf-4fdd-91b7-4ca08e8ea621/THESIS_REPORT_FINAL_Bas_Mentink.pdf).
- [31] 2019, OECD Roundtable on the Circular Economy in Cities and Regions. <https://www.oecd.org/cfe/regionaldevelopment/roundtable-circular-economy.htm>.
- [32] S. Sehnem, L.M.S. Campos, D.J. Julkovski, C.F. Cazella, Circular business models: level of maturity, *Manag. Decis.* 57 (2019) 1043–1066. <https://doi.org/10.1108/MD-07-2018-0844>.
- [33] M. Ellen, M.& Company, Towards the Circular Economy : Accelerating the scale-up across global supply chains, 2014.
- [34] J.C. Aurich, E. Schweitzer, C. Fuchs, Life Cycle Management of industrial Product-Service Systems, in: *Adv. Life Cycle Eng. Sustain. Manuf. Businesses - Proc. 14th CIRP Conf. Life Cycle Eng.*, Springer London, London, 2007: pp. 171–176. [https://doi.org/10.1007/978-1-84628-935-4\\_30](https://doi.org/10.1007/978-1-84628-935-4_30).
- [35] H. Gebauer, C. Saul, S. Joncourt, Use-oriented product service systems in the early industry life cycle, *Ekonom. Rev. Vasca Econ.* 89 (2016) 194–223.
- [36] A. Helander, K. Moller, How to become solution provider: System supplier’s strategic tools, *J. Business-to-Bus. Mark.* 15 (2008) 247–289. <https://doi.org/10.1080/15470620802059265>.
- [37] H. Dzwigol, M. Dzwigol-Barosz, Sustainable development of the company on the basis of expert assessment of the investment strategy, *Acad. Strateg. Manag. J.* 19 (2020) 1–7.
- [38] S. Jørgensen, L.J.T. Pedersen, The Circular Rather than the Linear Economy, in: 2018: pp. 103–120. [https://doi.org/10.1007/978-3-319-91971-3\\_8](https://doi.org/10.1007/978-3-319-91971-3_8).
- [39] A. Kwilinski, I. Ruzhytskyi, V. Patlachuk, O. Patlachuk, B. Kaminska, Environmental taxes as a condition of business responsibility in the conditions of sustainable development, *J. Leg. Ethical Regul. Issues.* 22 (2019).
- [40] P. Lacy, J. Rutqvist, Waste to wealth: The circular economy advantage, Palgrave Macmillan UK, London, 2016. <https://doi.org/10.1057/9781137530707>.
- [41] O. Laktionova, V. Koval, N. Savina, B. Gechbaia, The models of matching financial development and human capital in national economy, *Bull. Georg. Natl. Acad. Sci.* 15 (2021) 177–184.
- [42] V.T.T. Technical, The concept of value in circular economy business models Teuvo Uusitalo, Maria Antikainen, *ISPIM Innov. Forum.* (2018). [www.ispim.org](http://www.ispim.org).
- [43] G. Vijayan, N.H. Kamarulzaman, A. Mukherjee, S.K.N. Vaiappuri, Strategic value creation in a supply chain, in: *Handb. Res. Glob. Supply Chain Manag.*, 2016: pp. 186–204. <https://doi.org/10.4018/978-1-4666-9639-6.ch011>.
- [44] M.A. Camilleri, Corporate sustainability, social responsibility and environmental management: An introduction to theory and practice with case studies, Springer International Publishing, Cham, 2017. <https://doi.org/10.1007/978-3-319-46849-5>.
- [45] I. Mikhno, V. Koval, G. Shvets, O. Garmatiuk, R. Tamošiūnienė, Green Economy In Sustainable Development And Improvement Of Resource Efficiency, *Cent. Eur. Bus. Rev.* 10 (2021) 99–113. <https://doi.org/10.18267/j.cebr.252>.
- [46] K. Majchrzak, P. Olczak, D. Matuszewska, M. Wdowin, Economic and environmental assessment of the use of electric cars in Poland, *Polityka Energ.* 24 (2021) 153–167. <https://doi.org/10.33223/epj/130209>.
- [47] F. Ellen MacArthur, Delivering the Circular Economy: A Toolkit for Policymakers, *Deliv. Circ. Econ. A Toolkit Policymakers.* (2015) 177.