



Development of Circular Economy: Opportunities and Impediments

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Abstract: The objective of this paper is to outline the potential and outlooks of development of circular economy in Bulgaria, as well as demonstrate the need for adequate measures on part of public authorities to encourage this change. The research is based on a primary survey of Bulgarian employers' attitudes towards pursuing a corporate policy relating to the principles of sustainable development, which was conducted among 400 enterprises. The analysis reveals untapped potential not only with regard to a more efficient use of resources, in both the private and public sectors, but also in terms of underestimating the significance of the issue. The firms could significantly reduce their costs, improve their compatibility and their export potential if they apply new business models and new innovative technologies, which are both resource-efficient and eco-friendly. The research and analytical methods used for the development of the paper involve graphical and table presentation of statistical and empirical data and survey of available legal and analytical research on the topic. The conclusions reached reveal a number of obstacles slowing down the transition to a real circular economy model. That would require speeding up the reform in the eco-fiscal and innovative government policies. The paper's added value lies not only in the analytical examination of the issues, but above all in deriving recommendations for future actions.

Keywords: circular economy; sustainable development; energy efficiency; waste management; eco-fiscal policy; ecological transformation

JEL classification: Q50, Q51, Q56, Q58

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Razvoj krožnega gospodarstva: priložnosti in ovire

Povzetek: Namen prispevka je predstaviti potencial razvoja krožnega gospodarstva v Bolgariji ter pokazati potrebo po ustreznih ukrepih s strani javnih organov za spodbujanje te spremembe. Raziskava temelji na primarni raziskavi odnosa bolgarskih delodajalcev do izvajanja korporativne politike, ki se nanaša na načela trajnostnega razvoja, ki je bila izvedena med 400 podjetji. Analiza razkriva neizkoriščen potencial ne le v zvezi z učinkovitejšo rabo virov, tako v zasebnem kot v javnem sektorju, ampak tudi v smislu podcenjevanja pomena tega vprašanja. Podjetja bi lahko znatno znižala svoje stroške, izboljšala svojo združljivost in izvozni potencial, če bi uporabila nove poslovne modele in nove inovativne tehnologije, ki so tako varčne z viri in okolju prijazne. Uporabljene raziskovalne in analitične metode vključujejo grafično in tabelarno predstavitev statističnih in empiričnih podatkov ter

pregled razpoložljivih pravnih in analitičnih raziskav na to temo. Ugotovitve kažejo na številne ovire, ki upočasnjujejo prehod na model pravega krožnega gospodarstva. To bi zahtevalo pospešitev reforme v ekofiskalnih in inovativnih vladnih politikah. Dodana vrednost članka ni le v analitičnem pregledu vprašanj, ampak predvsem pri oblikovanju priporočil za prihodnje ukrepe.

Ključne besede: krožno gospodarstvo; trajnostni razvoj; energetska učinkovitost; ravnanje z odpadki; ekofiskalna politika; ekološko preoblikovanje.

JEL klasifikacija: Q50, Q51, Q56, Q58

Introduction

The growing consumption of resources and its environmental impacts call for a change in the economic model. The concept of 'circular economy' is part of such change. As defined by the Agency for Environment and Energy Management (ADEME2014) 'circular economy is an economic system of exchange and production, whereby each stage of the life cycle of a product (good or service) is geared towards enhancing the efficiency of using resources and reducing the harmful impact on the environment, thus guaranteeing the well-being of individuals.'¹ This is a closed loop encompassing all three areas: producer supply and responsible choices, consumer demand and behaviour, and waste management.

The Ellen MacArthur Foundation defines a circular economy as one that is restorative, and one which aims to maintain the utility of products, components and materials and retain their value (EMF, 2015a).

Circular economy is a model aiming at preserving and increasing the value of resources used in production and consumption, while reducing their impact on the environment, during the whole life cycle of the products (ACR+report, 2015).

The ambition is that the evolution of CE based industrial production instead of the prevailing linear models will not only have a positive impact on the environment but also contribute to economic growth (COM, 2014; EMAF, 2012).

To rise up to the current challenges facing the economy in the context of the scarce and finite, as well as increasingly costly resources, on the one hand, and the environmental needs, on the other, circular economy steps on three fundamental principles, a summary of which is shown in Figure 1.

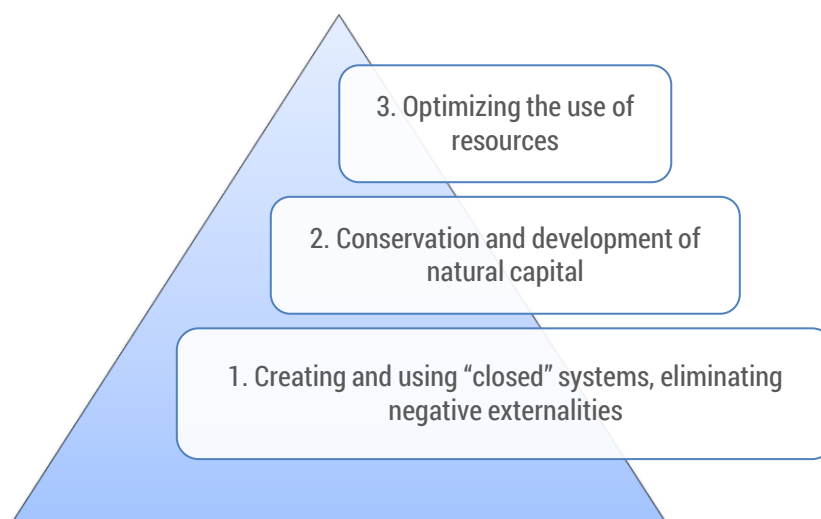


Figure 1. Principles of Circular Economy (Source: author's elaboration)

¹ See: <http://www.ademe.fr/sites/default/files/assets/documents/fiche-technique-economie-circulaire-oct-2014.pdf>

The observance of each of these principles leads to a sparing, responsible and efficient use of resources. This is made possible through controlling the use of finite and balancing the flows of renewable resources. The effect is threefold: economic, environmental, and social. Therefore, this model is an integral part of the concept of sustainable development.

Unlike the linear economy model (extraction, production, consumption, and waste), circular economy produces goods and services while limiting the use of raw materials and energy, on the one hand, and reducing waste generation, on the other. Central to the circular economy concept is the notion that the value of materials and products is kept as high as possible for as long as possible. This helps to minimise the need for the input of new material and energy, thereby reducing environmental pressure. Circular material use, including recycling, re-use and refurbishment, aims to reduce the generation of waste as well as our economy's dependence on extraction and imports of raw materials. Individual businesses could achieve lower input costs and, in some cases, create entirely new profit streams (EMAF, 2014).

This is a practice-oriented concept. An essential element of this model is the production of durables. Products should be created in such a way so as to allow repair, while also guaranteeing maintenance of spare parts production. Products should be suited for reuse or shared use and have a maximum life span. And finally, circular economy requires the creation of products that are made to decompose, and their components or subsystems are reusable as components in making new products. Recycling (as far as possible) of the parts that cannot be reused or repaired is crucial.

The transition to a circular economy shifts the focus onto reuse, refurbishment and recycling of existing materials and products. On the one hand, this requires reducing the amount of generated waste, and on the other, a change in the behavior model of manufacturers related to the supply of a new type of products which can be reused (Matete and Trois, 2008). Advances in eco innovations provide new products, processes, technologies, and organizational structures which enable a transition towards business models based on refurbishment, reuse or recycling of products or their components (Geng and Doberstein, 2008, Naustdalslid, 2014).

The Circular Economy provides a baseline for what needs to be done to reduce the resource dependence of the economy significantly and durably and to move towards overcoming the scarcity of non-renewable natural resources. It is a new way of perceiving the existing links between markets and businesses and rethinking the perception of waste as a natural resource.

Implementing the principles of circular economy related to waste management and reuse, for example, offers efficient alternatives to the problems arising from the rapid increase of waste generated in production (Lisney, Riley and Banks, 2004; Boiral and Croteau, 2001).

Such a transformation of the economy is also a means to obtain future prerequisites for growth. This is because the transition from an extraction- and consumption-based production to more complex development models would lead to long-term growth strategies. As such, it has the potential to bring both environmental and economic benefits, and it is increasingly recognised as the resource use mechanism that would allow societal and environmental sustainability (Ivanova and Sterew, 2019). Future competitiveness will be a function of energy efficiency and resource management (Ivanova, V. 2013).

The ultimate aim of circular economy is to disconnect economic growth from the depletion of natural resources by creating innovative products, services, and business models, taking into consideration all flows throughout the life of the product (COM, 2012).

Going green to achieve greater competitiveness and sustainability of production has become an unavoidable necessity for firms. (Bansal, P. and Roth, K.,2000). The primary focus here is on resource efficiency leading to reduced production costs and productivity growth. To this effect, the actions related to waste recovery and reuse, and its actual reduction carry considerable potential (Frecker, A., 2003).

Further steps to increase resource productivity by 30% by 2030 would lead to almost 1% higher GDP, thus creating an extra 2 million jobs.² At the same time, the costs of enterprises are expected to decrease by 8% of the annual turnover.³

This is an essential element of the vision of the Seventh EU Environmental Action Programme (7th EAP)⁴ whose main task is shifting European economy into a resource-efficient, green and competitive low-carbon economy with a special focus on converting waste into a resource.

Applying the new model of circular economy should bring about a radical change in the production and consumer behaviour models and, at the same time, be incorporated into the new concepts of territorial and regional development. This would allow to:

- reduce energy consumption;
- create sustainable cities;
- drastically reduce waste generation and further enhance the potential for their recycling and re-use;
- create new 'green' jobs in the green industries.

These processes of greening business operations for sustainability and development purposes are linked to implementing environmentally responsible business practices and applying circular economy principles.

The attitudes in the public domain are that SMEs are more inclined to ignore the principles of environmental production and as they produce mainly for the national market this exempts them from the responsibility of applying the European environmental standards.

The paper aims to outline the potential and prospects of development of circular economy in Bulgaria while demonstrating the need for the public authorities to take adequate measures to promote such a change.

The leading hypothesis of research is that a significant part of Bulgarian employers has an overly general idea of the advantages of circular economy and underestimate its potential.

The sub-hypothesis demonstrated is: The policymakers should intensify its role in creating positive leadership attitudes towards applying the circular production principles. Industrial symbiosis is already taking place in individual firms in Bulgaria. However, there is no targeted government policy.

2. Methods

The analysis is based on a survey of Bulgarian firms from various sectors and branches of economy⁵. The survey explores the attitudes of employers towards carrying out ecological transformation and applying the principles of circular economy. The analysis considers the existing management experience, the level of implementing European standards, as well as problem areas at industry level.

The sample covers 400 firms⁶. One person per firm was interviewed – manager (executive director), economic director or representative of the firm's administration management. The purpose was to obtain primary empirical information which would allow reaching adequate conclusions about the principles of eco-friendly production applied at industry level and economy wide.

Of particular interest are the employers' views about the relative advantages at the current stage in implementing the circularity principles. The survey explores the outlooks and perceptions about the benefits the firms could reap in the

² See Technical report 2014-2478 'Modelling the Economic and Environmental Impacts of Change in Raw Material Consumption' (2014), Cambridge Econometrics

³ See <http://ec.europa.eu/environment/newprg/index.htm>

⁴ See OJ L 354, 28.12.2013, pp. 171-200.

⁵ This survey is part of an R&D project on "Developing circular economy in Bulgaria" implemented by an academic team from UNWE, Sofia. It was carried out in 2018 and covers a three-year period.

⁶ The respondent firms are members of the Industrial Capital Association, the Construction Chamber in Bulgaria, the Bulgarian Chamber of Economy, and the Sofia Chamber of Commerce and Industry.

future if they followed these principles. The information gathered gives a picture about the availability of good practices, including internal policies, of applying eco-friendly and resource saving technologies.

The research and analytical methods used for the development of the paper involve graphical and table presentation of statistical and empirical data and survey of available legal and analytical research on the topic.

3. Results

The distribution of respondents by industry is the following: manufacturing – 65%, trade – 8 %, services – 12% and construction – 15%.

The industries that are most represented are the machinery and food industries (24.8%), followed by the clothing and textile industry, the chemical industry, electronics, and timber processing (total of 25.4%). The presence of representatives of various sectors and branches of the economy of different size and stability allows for a multi-aspect analysis. Most of the companies in the sample are active in sectors where the opportunities and effects of implementing circular economy are sizeable, which provides additional arguments in support of the leading hypothesis.

Most respondents are small and medium-sized enterprises (SMEs) – 56.7%, corresponding to the dominant production unit in the Bulgarian economy. Merely 7% of the firms have a staff of over 250 people (Figure 2).

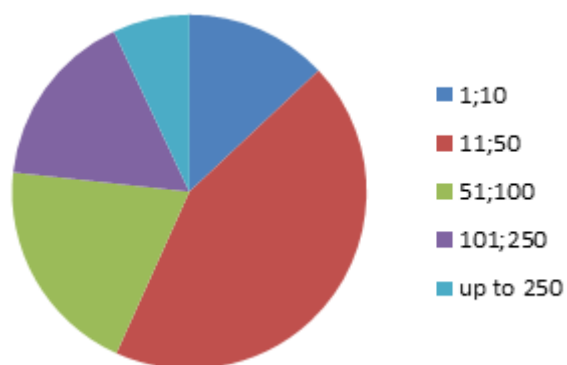


Fig 2. Number of employed in the companies involved in the survey

Source: Authors' elaboration

The output data support the following general findings:

3.1 Certification of businesses

A total of 54.8% of the surveyed businesses hold international certificate ISO 9001:2008, of which only 8.5% are certified to ISO 14001:2004 (environmental credential). This certificate is held by 100% of the energy companies, 49% of the extractive industry, 25% of the transport industry and 16.4% of construction companies. This suggests that the industries, where the level of active state interference and control is considerable, tend to apply the green standards to a greater degree. The ecological standards and the potential and importance of ecological transformation remain largely underestimated by Bulgarian employers.

The test for existence of statistically significant relationship between a company's size and certification to both standards has shown to be positive (chi-square=0.000, Cramer $V^2 = 0.323$). This effectively confirms that larger-sized firms tend to apply to a greater extent the ecological production standards. Data reveals that none of the small-sized firms (of below 10 employees) are certified to both international standards. With no certificate at all are 47% of the smallest-sized firms, 34,3% of the firms with up to 50 employees, and below 15% of the larger-sized firms. For SMEs these results are accounted for by both the lack of knowledge and understanding of the certification process, as well as the lack of sufficient financial resources for technological equipment and fulfilment of the relevant criteria.

3.2 Structure and relative shares of investments

The survey also considers the funds allocated by businesses for new equipment, implementation of new technology, repair and overhaul of the existing technical equipment, training of staff, R&D, implementation and/or upgrading of green technology.

Table 1 shows the relative shares of investments along with employers' assessment about their effects.

Table 1: Relative shares of investments (%) by type and volume

	Share of	Total	Investments	Results	
	below 10%	10-30%	Up to 30%	poor	good
New equipment	32,7	22,6	44,7	27,5	72,5
Implementation of new technology	46,4	31,8	21,8	32,8	67,2
R&D	86,6	5,4	8,1	44,5	55,5
Implementation and/or upgrading of green technology.	56,8	37,2	6,0	28,0	72,0

Source: Authors own work

4. Discussion

All stakeholders should be involved in such a transition. It is the state's role to develop policies and ensure framework conditions, predictability, and confidence for businesses. The businesses themselves are the ones to overhaul the whole scheme of supply and marketing in order to accomplish circular and efficient use of resources. The shift to a circular model is attractive to businesses because of the economic benefits and job creation, yet not enough for the transition to occur. Just as important is the role of public authorities in widely promoting and launching best practice campaigns, initiatives, and actions in the area of ecological responsibility.

The existing infrastructure, economic models, and technology, coupled with the established behaviour, hold the economy 'stuck on' the linear model. Companies may lack the information, confidence, and capacity to shift to circular economy solutions. The financial system often falls short of providing investments in enhancing efficiency or in innovative economic models, which are seen as riskier and more complex, thereby discouraging most traditional investors.

In order for the EU objectives for efficient use of resources by 2030 to be achieved, a transition to a circular economy model should become a national priority. Increasing energy efficiency or reducing emissions, as significant as these may be, is not sufficient. Apart from waste reduction and recycling, the concept should be expanded further to also include lengthening the life cycle of products and breaking the dependence between economic growth and waste generation.

The state should encourage investments in circular economy innovations and their deployment by making it easier to mobilise more private sector funds for resource efficiency. The EC proposals with regard to long-term financing⁷ and occupational pension funds⁸ included requirements for disclosing the relevant financial information to investors or for taking into account the investment risks associated with the scarcity of resources and climate change. The eco-fiscal policy has a complementary role in providing the right signals for investing in resource efficiency by eliminating the environmentally harmful subsidies and by shifting taxation from labour to pollution and resources.

Circular economy is grounded on the eco-friendly outlook and observance of environmental standards. In this regard, launching low-carbon productions, reducing greenhouse gas emissions and transition to renewable energy are priority

⁷ See COM(2014) 168.

⁸ See COM(2014) 167.

axes of development. Setting of specific and measurable targets both with regard to renewable energies and energy efficiency would mobilise the efforts of local authorities and would focus the actions and initiatives in this direction.

Setting specific numerical parameters to be achieved in the short term would provide more concreteness, security and safeguards for businesses and would overcome the perception of campaigning. Setting of concrete objectives for reducing the share of landfill waste (for instance by 50% by 2025), or 100% recycling of plastic waste and progressive replacement of plastic packaging (where possible) by organic packaging are steps that could lead to lots of business initiatives, including new jobs.

As regards SMEs, the policy of the state could be much more supportive and committed. So far, it has been mainly limited to the energy efficiency programme. In order for a real ecological transformation of production models to take place, businesses must foster and co-finance initiatives for technological renovation, purchase of new resource-efficient technologies that minimise waste generation, and deployment of waste-free technologies.

In order for such a model to be built and become effective, several successive steps are required:

- Develop a strategy and long-term goals. It should be more complex and comprehensive, and should transcend the currently drafted National Waste Management Plan (2014-2020);
- Promote and launch the eco-design concept. To this effect, raising the awareness of best practices would mobilise businesses and bring about a more radical change in production models. Branch organisations, the Bulgarian Industrial Association and professional organisations could play an essential role in this respect;
- Strengthen the requirements regarding the extended producer responsibility could speed up the transition to a circular economy model.
- Advance projects (also through economic incentives) involving technological innovation of processes, new products and materials resulting in 'greening' industrial productions and lengthened life cycle of products;
- Create favourable environment for increased involvement in separate collection of waste by both consumers and producers. This would facilitate the supply of quality material to recyclers and considerably enhance the efficiency of the process;
- Successful integration of eco-fiscal tools while keeping the principle of fiscal neutrality could also be a lever for increased reuse of waste in the production process;
- Indicators need to be developed to measure the progress (environmental and social), which can be applied in parallel to GDP.

5. Conclusion

From the analysed studies, it is possible to conclude that the transition to a circular economy model has been proceeding sluggishly. The transformation is just beginning, and this process has been slow and cumbersome. Some of the main hurdles include: the low manager and entrepreneur awareness; the rigidity of part of businesses (fear of the new and unknown); lack of desire for change; insufficient resource for technological upgrading and incorporation of new eco-friendly and energy-efficient technologies; low motivation, lack of human resources, lack of confidence in the security of data, lack of preparation to integrate the systems, etc.

The existing infrastructure, the economic models, and technologies, along with the established behaviour, keep the economy clinging onto the linear model. Companies may lack the information, confidence, and capacity necessary to shift to circular economy solutions. The financial system often falls short of providing investments in efficiency improvements or in innovative economic models, which are perceived as riskier and more complex, and this deters many traditional investors.

All this supports the initial assumption of the paper.

Developing and promoting the concept of circular economy, which maximises resource recovery, could become a generator of a new type of economic growth and create further jobs, thus providing a resolution to major societal challenges in the face of the finite natural resources and their ever increasing prices on the international markets, as well as eco footprint.

A new, more global, and integrated vision is needed, in which the state's role is to foster a change in the economic entities' behaviour and risk management and launch new rules and regulations. Only this can help create conditions for a genuinely successful model of eco-friendly economy. Growing aware of that is a new challenge both in terms of implementing the circular economy model and the need for pursuing a different type of macroeconomic policy and regulation.

Realizing the fact that the circular economy transition is turning from a voluntary choice into an inevitable necessity can significantly shorten the time required to implement this transformation and channel the efforts of all parties involved – the government, local authorities, companies, NGOs, customers.

The conclusions of this study are based on investigation into only the part related to applying the circular economy principles by business representatives. Further deepening of the analysis could highlight the benefits of shifting the model of economic growth at a macro level and provide additional evidence of the value added in circular economy and the need of active involvement by the State to promote such transition. Future studies should also explain in greater depth how the circular economy determinants can be supported through the micro, meso and macro levels.

Note: Some parts of the paper have been presented at the 2nd International Scientific Conference on IT, Tourism, Economics, Management and Agriculture – ITEMA 2018.

References

1. Association of Cities and Regions for Sustainable Resource Management (2019). ACR+ Webinar: Cross-regional synergies in the transition to circular economy. Available at <http://www.acrplus.org/en/> [Accessed: 21. 08. 2018].
2. Bansal, P., and Roth, K. (2000). Why Companies Go Green: A Model of Ecological Responsiveness, *Academy of Management Journal*, 43(4), 717-736.
3. Boiral, O., and Croteau, G. (2001). Développement durable et synergie des sous-produits: quelques exemples au Québec. *Nouvelles tendances en management*, 3(2), A1-A2.
4. Cambridge Econometrics (2014). Modelling the Economic and Environmental Impacts of Change in Raw Material Consumption: Technical report 2014-2478. Brussels: Cambridge Econometrics.
5. Ellen MacArthur Foundation (2012). Towards the Circular Economy. London: Ellen MacArthur Foundation.
6. Ellen MacArthur Foundation (2014). Towards the Circular Economy: Business Rationale for an Accelerated transition. London: Ellen MacArthur Foundation.
7. Ellen MacArthur Foundation (2015). Growth within: A Circular Economy Vision for a Competitive Europe. London: Ellen MacArthur Foundation.
8. Ellen MacArthur Foundation (2015a). Circular economy overview. Available at: <http://www.ellenmacarthurfoundation.org/circular-economy> [25.6.2019].
9. European Commission (2011). Roadmap to a Resource Efficient Europe: COM/2011/0571 final. Brussels: European Commission. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52011DC0571&from=EN> [25.6.2019].
10. European Commission (2012). Ecodesign Your Future: How Ecodesign Can Help the Environment by Making Products Smarter. Brussels: DG Enterprise & Industry and DG Energy.
11. European Commission (2013). The 7th EU Environmental Action Programme to 2020: 'Living well, within the limits of our planet'. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013D1386&from=EN> [25.6.2019].
12. European Commission (2014). Towards a circular economy: A zero waste programme for Europe. European Commission. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52014DC0398&from=EN> [25.6.2019].
13. European Commission (2015). *Closing the Loop: An EU Action Plan for the Circular Economy COM/2015/0614 final*. Brussels: European Commission. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52015DC0614&from=EN> [25.6.2019].
14. Fricker, A. (2003). Waste Reduction in Focus. *Future*, 35(5), pp. 509-519.
15. Geldron, A. (2013). Economie circulaire: notions. Angers: ADEME.
16. Geng, Y., and Doberstein, B. (2008). Developing the circular economy in China: Challenges and opportunities for achieving "leapfrog development" *International Journal of Sustainable Development and World Ecology*, 15(3), pp. 231-239.
17. IDDRI (n.d.). L'Iddri, think tank qui facilite la transition vers le développement durable. Available at: <https://www.iddri.org/fr/iddri-en-bref> [25.6.2019].
18. Ivanova, V. (2013). Opportunities for the Green Economy in Bulgaria. *Economic Alternatives*, 4, pp. 35-45.

19. Ivanova, V., and Sterew, N. (2019) From Sustainability to a Model of Circular Economy: The Example of Bulgaria. *Proceedings of INTCESS 2019- 6th International Conference on Education and Social Sciences*, 4-6 February 2019. Dubai: OCERINT, pp. 757-766.
20. Lascoumes P., Bonnaud L., Le Bourhis J.-P., and Martinais E. (2014). *Le développement durable :une nouvelle affaire d'Etat*. Paris: Presses Universitaires de France.
21. Lisney, R., Riley, K., and Banks, C. (2004). From Waste to Resource Management : Part 2. *Management Services*, 48(1), pp. 8-14.
22. Lockie D, Sonnenfeld D., and Fischer F. (Eds.) (2013). *Handbook of Environmental Sociology*. London: Routledge.
23. Matete, N., and Trois, C. (2008). Towards zero waste in emerging countries: A South African experience. *Waste Management*, 28, pp. 1480-1492
24. McDonough, W., and Braungard, M. (2002). *Cradle to Cradle: Remaking the way we make things*. New York: North Point Press.
25. Naustdalslid, J. (2014). Circular economy in China: The environmental dimension of the harmonious society. *International Journal of Sustainable Development & World Ecology*, 21(4), pp. 303-313. Doi: [10.1080/13504509.2014.914599](https://doi.org/10.1080/13504509.2014.914599).
26. Rotillon, G. (2010). *Economie des ressources naturelles*. Paris: La Decouverte, Reperes.
27. Rudolf F. (2013). De la modernisation écologique à la résilience: un réformisme de plus? *Vertigo - la revue électronique en sciences de l'environnement* 13(3) [online]. Available at <http://vertigo.revues.org/14558> [11. 08. 2018]
28. UNEP (2011). Decoupling Natural Resource Use and Environmental Impacts from Economic Growth: A Report of the Working Group on Decoupling to the International Resource Panel. Paris: United Nations Environment Programme.