



The role of the sharing economy in achieving the environmental objectives of the European Union - new business models in closing of the loop of the supply chain (SSC / CLSC)

Katarzyna Michniewska PhD, environmental economist, Military University of Technology, Faculty of Logistics
e-mail: katarzyna.michniewska@wat.edu.pl

Keywords: CLSC – closed loop of the supply chain, product fee, EPR – extended producer responsibility), recovery and recycling, waste management, SSC – sustainable supply chain, sharing economy

Abstract: The purpose of this article is to show the influence of the new sharing economy trend on the implementation of environmental objectives of the European Union. The previous relationship between new business models for closing of the supply chain loop and the introduction in Poland in 2002 of obligations related to the product fee implemented within the framework of the extended producer responsibility (EPR) are relatively insignificant. This concept is carried out by defining minimum levels of recovery and recycling in the relevant groups of packaging which the entrepreneur (producer, importer, entity placing packaged products on the market) is obliged to provide. This is to ensure that the commune has funds for the collection and processing of waste or, in relation to the entrepreneurs who avoid the trouble of organising a system of recovery and recycling, to force them to incur the product fee for the marshal's office.

Requirements imposed from above appear to provide little motivation, because still too much waste is sent to landfills. As a counter-proposal to the model of the consumer (linear) economy, the model of the recirculation economy is emerging, in which an important role is played by a new consumer movement defined as the sharing economy. This trend out of the deficit of raw materials builds a competitive advantage. Consumers who care more about access to raw materials or products than their possessions are initiating entirely new market trends. In this way closing of the loop of the supply chain through the reuse of the goods concerned is achieved. Neither concept, however, can exist without efficient reverse logistics – it is not possible to supply goods or services to the consumer without caring about their reception or the management of residues. We are witnesses of revolutionary changes caused by technological development and capacity limitations of the environment. We see a dynamic process of adaptation of man to the changed economic and ecological conditions.

The business model that guarantees recovery and recycling – industry or consumer – which is closer to the environmental aspects

The following terms are often met in the literature: the closed production cycle, the closed loop of the supply chain, sustainable production - all these terms refer to a new approach to creating products and services in connection with the devastation of the environment, which has happened as a result of the dynamic development of consumption. These terms have been joined by circular economy, publicised by the European Commission for promotional purposes of a new approach described in the amendment of the framework directive. The main objectives of the recirculation economy include:

- Increasing the level of preparation for the reuse and recycling of municipal waste up to 65% in 2030.
- A ban on the storage of segregated waste and reducing the proportion of municipal waste landfilled to 10% by 2030.¹

- Increasing the preparation for reuse and recyclability of packaging waste up to 75% by 2030, taking into account intermediate targets of 65% by 2025 and even more ambitious targets for the selected material groups.²

Requirements for recovery and recycling within the system of extended producer responsibility, are subject to penalties in the form of product fees for failure to perform. These penalties, however, are not sufficiently motivating to limit the actual depositing of waste in landfills and further encouragement are low fees for landfilling. To make changes, additional incentives are necessary that will cause change in the behaviour in the field of waste management. To achieve new goals industry must redesign the existing business models. Consequently, it seeks to modify the raw material sourcing by departing from raw materials for the benefit of secondary raw materials or synthetic substitutes. The growing role of nanotechnology in developing these substitutes can be seen in this case. Those responsible for the operation of supply chains recognise that it is necessary to improve planning and product development towards eco-design guaranteeing recovery and recycling of the product after use. At the same time supply chains should be improved in terms of responsibility for products throughout the product life cycle.³

An important support for meeting the above-mentioned objectives are the following three elements:

- industrial ecology, that is the creation of industrial parks in line with the principle of sustainable development by way of which the above-mentioned changes are performed,
- reverse logistics, which would treat each product as a source of raw materials after the end of its life cycle (reuse would be planned at the design stage of products)
- aspiration to a sharing economy, where the key role is played not by selling but by renting products⁴.

The new business model is not clearly specified yet. It is questionable whether entrepreneurs looking for new ways to achieve a competitive advantage care more about its development or whether it springs from the needs of consumers who are close to environmental problems, but at the same time also interested in additional revenues from the rental of their property. While analysing the definition of sharing economy its complexity is clearly seen. Shared consumption, collaborative consumption or sharing economy are terms that describe economic models, based sometimes on unselfish sharing and exchange, but also on paid product hire⁵. The term is the opposite of ownership. It is a response to the unlimited use of the environment by large international companies within the framework of globalization. Passive approach to the environmental problems has resulted in the stimulation of consumer activity in this field. Technology and peer communication have caused an exponential increase in the scale of impact of money purchasing power in the economy⁶. The sharing economy engages consumers in environmental problems and allows them to take the initiative in this regard. The term “collaborative consumption” was introduced by Marcus Felson and Joe L. Spaeth in 1978⁷. Collaborative consumption is also

a term used for describing an attitude of attaching less and less importance by the public to the ownership of things and more importance to the benefit of access to goods and then only when they are they needed. This means the use of one resource by a much larger number of users, and so better and more efficient use of resources “closed” in products. The development of a sense of sharing also gives positive aspects of a sense of responsibility for the environment. It contributes visibly to the reduction of resource consumption. It is a grassroots initiative, and therefore particularly important and positively perceived by the younger generation. The sharing economy is a sign of rebellion against consumerism. Not only does it reduce unnecessary costs, operation and ownership, but at the same time protects nature. The issues of so-called sharing economy / collaborative consumption and that for many consumers access to something other than ownership (access over ownership) is more important today, are quite intensively discussed on both scientific and popular portals. Many scientists compare the sharing economy to communism, predicting its rapid end. However, the information on this phenomenon is increasingly widespread and very positively received by the consumer market. It gives them at the same time a sense of power and independence, allowing access to virtually any type of goods on earth (it turns out that the most successful are services previously unavailable to the average Joe, for example, such as private helicopter flights offered by Uber). The sharing economy guarantees cost reduction and care for the environment, while meeting the demand previously unattainable for a given consumer. It is noticeable both in the context of a growing number of services offered (e.g. carpooling, Airbnb, uniiverse), and the scale, which is achieved (e.g. using the service kiva.org since 2005 \$ 350 million has already been lent). Collaborative consumption is one of the currently dominant trends guaranteeing efficient use of resources. Not without significance for its growing popularity is the possibility of obtaining additional financial benefits associated with sharing possessions with other consumers. According to a survey conducted in January 2012 in the USA by Campbell Mithun⁸, 60% of respondents declare that the concept of sharing goods is convincing for them, and 71% of those who have used this type of service intends to continue such behaviour. In Poland, the known actions of this type are travelling with the Uber or BlaBlaCar. The so-called market of peer-to-peer services may soon transform the way societies function. The sharing economy is booming and contrary to the sceptics, it is not directed only to selected industries. Thanks to the Internet virtually everything has become a generally available commodity (Internet of Things – IoT). So you can rent a garage (parkatmyhouse.com) or a workplace (desksurfing.net), rent a car or another means of transport for a day (lyft.me, spinlister.com), and even sign up for a fee or free of charge to someone’s WiFi. Sharing the property is not always aimed at achieving a profit, although this model is not precluded. A large part of co consumers provides their goods for free or in the form of barter. However, most users of this shared system treats it as an opportunity for additional income. The system itself is extremely efficient, resulting in the multiple use of raw

materials, fully democratic and based on trust, to which largely the Internet assessment of the users contributes. In this way, a new generation of consumers – suppliers, who guarantee cheaper and more personalised products and services, is created. An example of sharing economy model is Barclays Cycle Hire - bike rental in London and Zipcar – car rental by the hour. The most famous example of a sales model with the option to share is eBay – an auction portal; its Polish equivalent is Allegro.

The sharing economy is a sign of rebellion against consumerism. Not only does it reduce unnecessary costs, operation and ownership, but at the same time protects nature

The main pillar of the sharing economy is social media. In the past tutors taught their pupils how to share what they have. Today, this role has been taken over by social media such as Facebook, LinkedIn, Instagram, Twitter and many others, through which photos, videos, stories, opinions and views can be shared. Through them more is known about people than ever before, and communication with strangers in virtual reality it is a lot easier. With these tools the role of companies has been taken over by individuals. The Airbnb service operating since 2008 is present in 192 countries, and its database of 300,000 ads is daily browsed by more than 140,000 people. The portal gets a 15% commission of the price quoted in the advertisement (paid fifty-fifty by the sharing and the recipient, that is co-consumers), and the choice of properties is unlimited. It is estimated that by 2015, 4.4 million Americans and 5.5 million Europeans will have used the services of car sharing services, and the peer exchange market will be worth up to 26 billion dollars. This is quite an impressive amount for an emerging market which has virtually no production costs. The whole concept works because its foundation is its reputation on the Internet. Virtually each new portal operating on the principle of peer-to-peer (or among Internet users) is modelled on the system of ratings similar to those put up for auction sites, such as Allegro. To illustrate the range of changes 10 top sharing economy sites will be presented following a popular tourist portal⁹.

1. ONEFINESTAY.COM

This service offers stays in luxurious private houses whose owners are away from the city for some time. Guests can count on high-quality bed linen, towels, toiletries and cleaning service. For the time being the service applies only to the houses in London, New York and Paris, but soon new cities will also appear.

2. PARKATMYHOUSE.COM

This site offer the rental of private garages and parking places in different cities around the world, including convenient locations, such as near airports or railway stations. Available countries are: Australia, Canada, Denmark, the Netherlands, the United Kingdom and the United States.

3. GETAROUND.COM

More than 250 million cars in the US stand idle for more than 22 hours a day. Thanks to getaround.com we can rent one of them by the hour in such cities as San Francisco, Portland, Chicago, Austin, and San Diego. In a similar way and in more cities the relayrides.com service operates.

4. FLIGHTCAR.COM

Instead of paying for parking at the airport, you can lease someone your own car. Just leave it in a designated place, and the Flight Car service will take care of the rest. Each vehicle is insured for an amount of up to a million dollars, and customers using the vehicles can count on competitive prices, free navigation and insurance. The service is available at the airports of San Francisco International and Boston Logan.

5. LYFT.ME

This application is an interesting alternative to taxis (services are provided by non-professional drivers), and instead of fees for the drive lyft.me asks customers for free donations. The service is available in San Francisco, Los Angeles, San Diego, Seattle and several other US cities. Similarly the service Side Car (side.cr) operates.

6. EATWITH.COM

As an alternative to restaurants you can take advantage of Eat With - the service which allows you to eat meals in the homes of residents of London, New York, Miami, Paris or Budapest. Hosts can set prices, but they often allow you to bring your own alcohol. Similarly, the service cookening.com operates.

7. BOATBOUND.COM

This nautical equivalent of Airbnb allows you to hire private boats, which often for months stand idly moored at the quayside. Boatbound also offers third party liability insurance of up to a million dollars.

8. BLACKJET.COM

The service enables owners of private jets to sell vacancies on board their aircraft. So far in this way 3,300 seats on board in 1100 machines have been sold, and the booking itself takes a few seconds. The annual membership fee is 2.5 thousand dollars. Price per seat starts at a thousand dollars.

9. FON.COM

It is a global WiFi network through which we gain access to the Internet through private hotspots. Its members share their WiFi with others, and in return they can log on to a network of other people around the world for free.

10. EASYNEST.COM

Easynest helps to find a companion with whom you can share a room in a hotel, thus reducing costs. There are only rooms with two beds available¹⁰.

Practitioners emphasise that it is worth distinguishing the beta version of the shared economy - when the company delivers the product, which all consumers share, from the alpha version - in which people exchange products already owned via the Internet. It is clear, however, that in both cases the mass of waste generated decreases significantly and it is not carried out as a result of the threat of a penalty payment in the form of the product fee.

Those responsible for the operation of supply chains recognise that it is necessary to improve planning and product development towards eco-design guaranteeing recovery and recycling of the product after use

Such a procedure on the side of consumers makes it necessary to adapt to market trends on the side of industry - manufacturers, suppliers of products and services. In this situation, an underestimated role is assigned to reverse logistics.

Reverse logistics as a tool for environmental management - closing of the loop of the supply chain through the involvement of production plants

It is predicted that in the near future, according to the European Union plans, each product will have its own passport, since it is only a temporary form of storage of raw materials contained in it, which is compared to travel. Reverse logistics is a tool that can ensure the functioning of a classical economic model consisting in processes of purchase - sale of finished products in a way that guarantees respect for the environment. This is possible thanks to the efficient implementation of recovery and recycling of raw materials with the use of closed-loop supply chain model assumptions. Entrepreneurs trying to keep markets controlled by them should respond to expectations manifested by consumers. So if consumers want to use products / services as efficiently as possible (the number of products used and the frequency of usage), and then they also want to see raw materials the products were made of in other roles, the industry will have to adjust to that. For this reason, the **coordination of processes included in the reverse logistics of by entrepreneurs will allow to increase the added value generated by individual participants of supply networks without increasing the weight of raw materials involved in production processes.**

Thanks to the involvement of supply networks in economic aspects of environmental protection the ecological effect increases without the need for additional investment - for example through the creation of an effective zone of segregation of waste generated and selling it at the optimum cost for recycling. This conclusion is a result of the synthesis arising from the association of a specific added value with ecological effects that entail actions to attain that value. When planning logistics activities with the task of closing of the loop of the supply chain the following steps should be considered¹¹:

- selection of used products,
- assessment of collection centres,
- assessment of recovery facilities,
- optimisation of transport routes, taking into account recovery and recycling,
- planning of the future of used goods,
- selection of appropriate secondary markets for a given product,
- synchronisation of supply chain processes in a closed circuit,
- assessment of marketing strategies for ensuring recovery and recycling of products,
- and many others.

It should be emphasised that reverse logistics in supply chains means both economic and ecological benefits for its members. Specific ecological benefits, resulting from economic activities are:

- reducing the mass of deposited waste,
- reorganisation of waste management in industry, resulting in greater respect for natural resources,
- an increased mass of recyclable materials to be recovered and recycled,
- increased public involvement in selective waste collection,
- implementation of reverse logistics processes in the conducted business activity makes it possible to respect the principles of sustainable development, which is a source of competitive advantage for the supply networks, which first have implemented this concept in their strategy.

The need for environmentally friendly products as part of the sharing economy is particularly visible - consumers expect such an attitude from suppliers of products and services. These activities require systematisation and computerisation of recovery processes due to the heterogeneity of the recovered items. Changes in the consumer behaviour will stimulate the transformation in this area, causing a transition from a consumer society to a recycling society, which the new guidelines of European Union directives talk about. All these elements which are the contribution of individual enterprises implementing the principle of sustainable development will contribute to the attractiveness of enterprises and enhance their competitiveness, as well as the chance of their survival in the world of sharing economy. Still, it remains an open question, whether industry or consumers take care of the environment more effectively - some difficulties in the pursuit of closing the supply chain loop can be

We are witnesses of revolutionary changes caused by technological development and capacity limitations of the environment

seen on the side of the industry, which are also related to the lack of commitment on the side of consumers.

Barriers to the effective formation of new sustainable business models

Development strategies supported by the European Union were the genesis of the EPR in Poland. The extended producer responsibility, the genesis of which is Directive 94/62 / EC of the European Parliament and of the Council of 20th December 1994 on packaging and packaging waste, was introduced to Polish regulations by the 11th May 2001 act on entrepreneurs' obligations in the field of management of certain waste and on the product fee and the deposit fee (Journal of Laws 2001 No. 63, item 639). The motivation for the creation of this system was to extend responsibility for packaging waste generated in Poland in an uncontrolled way on producers putting on the market products in this packaging. Characteristic for this system is that the entrepreneur pays for the kilograms placed on the packaging market, from which the waste is generated. The problem is that the fee is disproportionately low in relation to other manufacturers' expenses associated with a given product, i.e. e.g. advertising budgets for placing the product on the market. No time is devoted to or no additional budget is allocated for the management of residues. In addition, the lack of precise eco-design rules, which were mentioned only enigmatically in non-compulsory for a long time harmonised standards, does not motivate enough to plan the recovery and recycling of their products. Under these restrictions, the existing system of collection and processing of packaging waste does not allow the organization of efficient recycling chains in Poland. The lack of statistical data on the actual net cost of collecting and processing recyclable materials causes chaos and information asymmetry¹² on the market. Often for the same raw material you either bear a disposal charge or have revenues generated from the sale of recyclable materials. Another drawback, which leads to lack of success in closing the supply chain loop, is the lack of mechanisms stimulating the demand for products from recycling - so the lack of customers of an artificially - because only statutorily - created market. This item is linked directly to the above-mentioned attitude of consumers. It is also customers who often do not apply themselves in the proper way to waste segregation, preventing the feed of recyclable materials for the recycling of supply chains, thus blocking their closing. The sharing economy is in this situation also a voice of protest against globalisation and environmental devastation connected with it, resulting from the continuous supplying new products (i.e. artificially shortening the product life

cycle, where by the low life of the product consumers are encouraged to buy newer models and dispose of previous substitutes¹³).

In addition, the weakening of the recovery and recycling system is affected by the lack of statistical tools, such as the planned database on waste and a register of entities obliged within the framework of EPR, which currently avoid carrying out their statutory duties and remain unpunished against non-compliance with statutory obligations. Therefore, an extensive concept is developed, but there are no sufficient tools to implement it in business practice. According to the author, lack of giving the proper meaning of the recycler in the recycling-stimulated supply chain is strategic for the success of the recycling system in Poland. Becoming aware of the principles and mechanisms of the logistics management of the supply chain needs to take into account the significance of the role of the recycler as a recipient of the effects of such a system in the process of recovery. The form and technique of waste segregation in Polish municipalities should depend on the recycler's needs, the recycler from a given area should be asked what way prepared raw material best suits his needs. This should happen by analogy to answers of the traditional supply chain to consumers' needs.

A comparison of the possibility of achieving the European Union objectives in different economic models was presented as a summary.

It is clear from the comparison presented in the table that stopping at the existing approach to production processes and waste management will continue to cause difficulties with the reduction of a negative impact of production on the environment. Changing the business model and closing of the loop of the supply chain, together with sharing products, known to increase their use, will contribute to a visible change in this area.

Not without significance is also the attitude of consumers to the products from recovery. The greater the demand for recycled products on the consumer side, the better the results of the supply chain supported by reverse logistics. The undisputed element is the need to build relationships within the closed-loop of the supply chain, where the key link is still the consumer. You need to be aware, however, that technological development will require further changes from us. A mistake made during the discussion on the amendments is taking into account only one variable, while the transformation is influenced by other factors. A good example of the results obtained with this type of assumption is the fear that a radical extension of human life will cause overpopulation of the Earth and will lead to the depletion of scarce resources needed for life. This assumption ignores a similar radical theory of creating wealth using nanotechnology and strong AI (artificial intelligence). For example, production facilities based on nanotechnology in 2020, will be able to create virtually any physical product from inexpensive materials and information¹⁴. Therefore, let us know that sustainable business

Thanks to the involvement of supply networks in economic aspects of environmental protection the ecological effect increases without the need for additional investment – for example through the creation of an effective zone of segregation of waste generated and selling it at the optimum cost for recycling.

models that are currently created with so much difficulty, will very soon expire. Their motivator is and will remain conscious and non-waste human functioning and not the threat of depletion of natural resources¹⁵.

Table 1.

A comparison of the possibility of achieving the European Union objectives in the field of recovery and recycling of various models of production and use of products.

EU objectives	Linear economy	Circular economy (CLSC)	Sharing economy
Increasing the level of preparation for re-use and recycling of municipal waste to 65% by 2030	A very low level of reuse and recycling	Striving for reuse and recycling	Reuse and recycling as the foundation of the model existence
A ban on storage of segregated waste and reducing the proportion of municipal waste on landfills to 10% by 2030	Difficulties with the large mass of municipal waste causing landfilling	Striving for the reduction of the land-filled waste through the use of the policy of "zero waste"	Continuous use of waste results in a natural reduction in the mass of waste submitted for depositing
Increasing the preparation for reuse and recyclability of packaging waste up to 75% by 2030, taking into account intermediate targets of 65% by 2025 and even more ambitious targets for the selected material groups.	Difficulties in implementing the increasingly higher percentage objectives of materials recycling	Striving for greater and greater reuse and recycling within the closed loop	High level of reuse resulting from the objectives of the sharing economy

SOURCE: Own study

Summary

The sharing economy both in the context of the functioning of businesses within the closed-loop of the supply chain, as well as individuals, is an element indicating the direction of modifying business models. Both areas are characterised by awareness of and respect for the value of natural resources. The independence of consumers within the sharing economy granted to them via the Internet will

change the behaviour of entrepreneurs, especially current companies that have the greatest negative impact on the environment, human health and life. Despite many aspects of the analysed range of changes it should be recognised that this is a positive trend. New business models are the human response to changing economic and ecological conditions. The sharing economy meets these requirements well, responding to the needs of environmental concerns manifested by its users. Therefore, its role is important. The impact of the sharing economy is perceptible both directly and indirectly. A direct observation of consumer attitudes shows the reduction in consumption of natural resources to produce new products which are not needed, as consumers share more effectively the existing ones. Indirectly, because by demonstrating their expectations in terms of durability and efficiency of products, they change the industry approach to mass production and short-term goods. It should be stated clearly that sharing economy, which is currently experiencing a severe boom, will have a very significant impact on achieving the EU objectives in the field of recovery and recycling of recyclable materials. This is a very important element that cannot be ignored in the study of the reverse logistics and achieving the closed-loop of the supply chain and the management of circular economy. ■

REFERENCES:

- www.businesstraveller.pl/rankingi/swiat-do-podzialu-10-najpopularniejszych-serwisow-ekonomii-dzielonej/3
- Botsman R., Rogers R., *What's Mine is Yours: The Rise of Collaborative Consumption*, Harper Collins 2010.
- Diamandis P., Kotler S., *Abundance: The Future Is Better Than You Think*, San Jose, 2012.
- Felson M. and Spaeth J. L., *Community Structure and Collaborative Consumption: A routine activity approach*, American Behavioral Scientist, 21 (March–April 1978).
- How to become a green SME in Circular Economy?* – materiał instruktażowy Komisji Europejskiej www.youtube.com/watch?v=V1Tszs48xCl
- Komunikat Komisji do Parlamentu Europejskiego, Rady, Europejskiego Komitetu Ekonomiczno-społecznego i Komitetu Regionów, *Zamknięcie obiegu – plan działania UE dotyczący gospodarki o obiegu zamkniętym*, Bruksela 2.12.2015 r.
- Kurzweil R., *The Singularity is near*, Viking Adult, San Jose 2005.
- Lesiak P., *Planowana destrukcja towarów jako model wzrostu gospodarczego*, Logistyka Odzysku 3/2013 (8).
- Michniewska K., *Gospodarka odpadami – rynek asymetrii informacji*, Logistyka Odzysku 1/2011 (1).
- Pochampally K. K., Nukala S., Gupta S. M., *Strategic Planning. Models for reverse and closed loop supply chains*, CRC Press 2009.
- Sundararajan A., *Sharing Is Contagious: An Infographic on the Rise of Collaborative Consumption*, MIT Press 2016.
- Wniosek dyrektywa Parlamentu Europejskiego i Rady zmieniająca dyrektywę 94/62/WE w sprawie opakowań i odpadów opakowaniowych, Bruksela 2.12.2015 r.

NOTES:

- Komunikat Komisji do Parlamentu Europejskiego, Rady, Europejskiego Komitetu Ekonomiczno-społecznego i komitetu regionów, *Zamknięcie obiegu – plan działania UE dotyczący gospodarki o obiegu zamkniętym*, Bruksela 2.12.2015 r.
- Wniosek dyrektywa Parlamentu Europejskiego i Rady zmieniająca dyrektywę 94/62/WE w sprawie opakowań i odpadów opakowaniowych, Bruksela 2.12.2015 r.
- How to become a green SME in Circular Economy?* – materiał instruktażowy Komisji Europejskiej www.youtube.com/watch?v=V1Tszs48xCl
- ibidem.
- Botsman R., Rogers R., *What's Mine is Yours: The Rise of Collaborative Consumption*, Harper Collins 2010.
- Sundararajan A., *Sharing Is Contagious: An Infographic on the Rise of Collaborative Consumption*, MIT Press 2016.
- Felson M., and Spaeth J.L. (1978), *Community Structure and Collaborative Consumption: A routine activity approach*, American Behavioral Scientist, 21 (March–April), 614–24.
- www.businesstraveller.pl/rankingi/swiat-do-podzialu-10-najpopularniejszych-serwisow-ekonomii-dzielonej/3
- www.businesstraveller.pl/rankingi/swiat-do-podzialu-10-najpopularniejszych-serwisow-ekonomii-dzielonej/3
- www.businesstraveller.pl/rankingi/swiat-do-podzialu-10-najpopularniejszych-serwisow-ekonomii-dzielonej/3
- Pochampally K. K., Nukala S., Gupta S. M., *Strategic Planning. Models for reverse and closed loop supply chains*, CRC Press 2009.
- Michniewska K., *Gospodarka odpadami – rynek asymetrii informacji*, Logistyka Odzysku 1/2011 (1).
- Lesiak P., *Planowana destrukcja towarów jako model wzrostu gospodarczego*, Logistyka Odzysku 3/2013 (8).
- Ray Kurzweil, *The Singularity is near*, Viking Adult, 2005.
- Diamandis P., Kotler S., *Abundance: The Future Is Better Than You Think*, San Jose, 2012.