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## Resource efficiency strategies based on the circular economy

A. Nikolaienko<sup>‡</sup>

**Purpose** – to describe resource efficiency strategies based on the circular economy.

**Design/Method/Approach.** Logical and critical, abstract-logical methods are used for the theoretical generalization of crucial approaches to the formation of resource-efficiency strategies based on the circular economy.

**Research results.** There were considered the scientific and theoretical approaches to the formulation of resource-efficiency strategies based on the circular economy. The circularity strategies within the production chain has been formed in the order of priority. The idea of classifying circular strategies has been expanded.

**Practical implications.** The results of the research allow establishing a target system of the circular economy structure, to show the possible effect of the circular economy.

**Originality/Value.** The theoretical bases for the development of the circular economy in terms of identification of the essential tools for the resource-efficiency strategies implementation based on the principles of the circular economy at micro-, macro-, meso-, and mega-levels.

**Research limitations/Future research.** The research serve as the basis for further evaluation and forecasting of the operation efficiency, costs optimization of the production resources and entity's commercial activity, making the mechanism for the sustainable economic development of the enterprise.

**Paper type** – theoretical.

**Keywords:** resource-efficiency; circular economics; level of economics; business model; development; strategy.

<sup>‡</sup>Artem Nikolaienko,  
wholesale manager,  
LLC NPO Energiya,  
Dnipro, Ukraine,  
e-mail: [ANikolaenko@dnu.dp.ua](mailto:ANikolaenko@dnu.dp.ua),  
<https://orcid.org/0000-0002-1626-5885>

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## Стратегії ресурсоефективності на засадах циркулярної економіки

Артем Сергійович Ніколаєнко<sup>‡</sup>

<sup>‡</sup>ТОВ «НПО Енергія», Дніпро, Україна,

**Мета роботи** – надати характеристику стратегій ресурсоефективності на засадах циркулярної економіки

**Дизайн/Метод/План дослідження.** Логіко-критичний та абстрактно-логічний методи застосовано для теоретичного узагальнення ключових підходів до формування стратегій ресурсоефективності на засадах циркулярної економіки.

**Результати дослідження.** Розглянуто науково-теоретичні підходи стосовно формування стратегій ресурсоефективності на засадах циркулярної економіки. Сформовано стратегії циркулярності в межах виробничого ланцюга в порядку пріоритету. Розширено уяву щодо класифікації стратегій циркулярності.

**Практичне значення дослідження.** Результати дослідження дозволяють сформулювати цільову систему структури циркулярної економіки, показати практичний ефект від циркулярної економіки.

**Оригінальність/Цінність/Наукова новизна дослідження.** Цим дослідженням розширено теоретичні знання стосовно розвитку циркулярної економіки в частині ідентифікації основного інструментарію для реалізації стратегій ресурсоефективності на засадах такої економіки на мікро-, макро-, мезо- та мегарівнях.

**Обмеження дослідження/Перспективи подальших досліджень.** Це дослідження – основа для подальшої оцінки і прогнозування ефективності функціонування, оптимізації витрат ресурсів у виробничо-комерційній діяльності суб'єкта господарювання на засадах циркулярності.

**Тип статті** – теоретичний.

**Ключові слова:** ресурсозбереження; кругова економіка; рівень економіки; бізнес-модель; розвиток; стратегія.

## Стратегии ресурсоэффективности на основе циркулярной экономики

Артем Сергеевич Николаенко<sup>‡</sup>

<sup>‡</sup>ООО «НПО Энергия», Днепр, Украина

**Цель работы** – описать стратегии ресурсоэффективности, основанные на циркулярной экономике.

**Дизайн/Метод/План исследования.** Логико-критический, абстрактно-логический методы использованы для теоретического обобщения критических подходов к формированию ресурсоэффективных стратегий на основе циркулярной экономики.

**Результаты исследований.** Рассмотрены научно-теоретические подходы к разработке ресурсосберегающих стратегий на основе циркулярной экономики. Циркулярные стратегии внутри производственной цепочки сформированы в порядке приоритета. Расширена идея классификации циркулярных стратегий.

**Практические последствия.** Результаты исследования позволяют сформировать целевую систему структуры круговой экономики, чтобы показать возможный её эффект.

**Оригинальность/Ценность/Научная новизна исследования.** Этим исследованием расширены теоретические знания о развитии циркулярной экономики с точки зрения выявления основных инструментов реализации стратегий ресурсоэффективности, основанных на принципах круговой экономики на микро-, макро-, мезо- и мегауровнях.

**Ограничения исследования/Перспективы дальнейших исследований.** Это исследование служит основой для дальнейшей оценки и прогнозирования эффективности деятельности, оптимизации затрат ресурсов в производственно-коммерческой деятельности хозяйствующего субъекта на принципах циркулярности.

**Тип статьи** – теоретический.

**Ключевые слова:** ресурсосбережение; круговая экономика; уровень экономики; бизнес-модель; развитие; стратегия.

## 1. Introduction

Due to the exacerbation of global environmental problems caused by the resource-consuming economy model, the global community is increasingly focusing on the change in crucial principles of production and consumption. The need for the public to become aware of the necessary introduction of the circular chains of creation, consumption, and recycling of the product has emerged, discarding the waste disposal and disposal phase and replacing it with the reproduction or application phase as raw material for other industries. Such a concept formation of economic development has led to the identification of the new problems, in particular, how to make such transformations profitable for significant manufacturing companies; how to organize the process of investment flows redistribution towards increase of the resource efficiency; what new competencies and knowledge are needed now for successful circular projects and so on.

The research's problem of the main drivers of the circular economy development is revealed more in the scientific papers of such researchers. However, in recent years the problem of reforming the economy, taking into account the principles of circularity, has been actively discussed in the domestic scientific literature, in particular in the works. The authors substantiated main conceptual categories and methodological approaches to determine crucial components of modern models of circular economy and ways of their implementation, including the micro-level.

The circular economy concept was introduced in 1990 with a view to a sustainable development strategy and proposed to address urgent problems of environmental degradation and resource scarcity.

The circular economy is the common name for activities aimed at energy saving, regenerative green production, and consumption (Murray, Skene, & Haynes, 2015). Unlike the traditional model of economic development, the circular model is the most successful way to save resources and materials, and thus to continuous economic growth.

The circular economy concept is gaining popularity among scholars and practitioners alike; which is evidenced by the rapid growth of peer-reviewed papers on circular economics: more than 100 articles were published on this topic in 2016, compared to only about 30 articles in 2014 (Geissdoerfer, Savaget, Bocken, & Hultink, 2017).

On the other hand, many consulting reports have recently been published on this topic (consultants are trying to show clients expert knowledge on the trends through such reports. For example, the largest consulting companies (eg, Accenture, Deloitte, E.Y., and McKinsey & Company) have published a large number of reports on economics in the past two years.

Exploring the new term "circular economy", one should mention the papers of Kirchherr, Reik, and Hackert, who have collected 114 definitions of circular economy and its 17 dimensions. Their results (Kirchherr, Reike, & Hekkert, 2017) suggest that the circular (round) economies are most often depicted as a combination of reduction, reuse and recycling measures, while often underscored that the circular economy needs systemic change.

In their researches, Murray, Scene and Hines (2015) suggest that the circular economy is the latest attempt to conceptualize the integration of economic activity with environmental and resource issues in a sustainable way. In other words, the concept of the circular economy combines old and well-formed notions of resource efficiency, making a bright economic aspect of saving the resources and the potential profits it accumulates.

## 2. Problem statement

The purpose of the research is to study the companies' resource efficiency management based on the circular economy, to identify the main strategies, to define the main challenges that management faces with the implementation of the circular economy principles.

## 3. Methods and data

In the course of the research, general and unique methods were applied: abstract-logical - for theoretical generalization of fundamental approaches to the formation of resource-efficiency strategies based on the circular economy; tabular - for generalization of results of the circularity strategies within the production chain.

The research's information base includes materials of scientific-practical conferences, monographs, and scientific papers of Ukrainian and international scientists, periodicals, and analytical reports of national and international financial organizations.

## 4. Results

The circular economy operates according to the 3R principles: reduce, reuse, and recycle (Cheung, et al., 2015; Potting, Hekkert, Worrell, & Hanemaaijer, 2017).

Leading companies are changing their business models to reduce the consumption of natural resources, materials, and minimize waste production. Several strategies for the companies development based on the circular economy have been formed, which in scientific studies have been abbreviated as circular strategies. As shown by a study by the Netherlands Environmental Assessment Agency (Potting, et al., 2017), strategies can be classified by priority according to the degree of circularity (Table 1). Analytical review of publications allows confirming that this is currently the most common approach to classifying circular strategies.

The implementation studies of the circular strategies show that new business decisions are continually emerging and, hence, changes are made to the above classification and, accordingly, to expand the theoretical foundations of the circular economy. For instance, Zvarych (2017) proposes to consider the fourth principle – the global social corporate responsibility (Responsibility) - as a must when forming the global circular value chains.

The urgency and global economic importance of the circular economy development define the need to address this issue at various levels of government. The apparent issue is the involvement of all participants in this economic relationship: producers, service providers, end-users, government, international organizations.

As Zvarych (2017) points out, "the circular economy models and their application are usually implemented at four system levels: micro-, macro-, meso- and mega-levels covering production, consumption, waste management and various government support programs. To promote, regulate, monitor, and evaluate the successful implementation of the circular economy" (Table 2).

Micro-level means circulation at the company or consumer level and includes stages of eco-design, clean production, packaging and logistics, consumption, waste collection and treatment, recycling, and recycling launch. Round implementation or circulation at the macro level corresponds to the city, province, region, and nation. That includes activities of eco-industrial parks and ecosystems of agriculture, as well as waste trade in industrial parks.

Table 1

Circularity strategies within the production chain, in the order of priority\*

Strategy	Name	Meaning
Smarter use and production of a product	R(0) - Refuse	Make a product redundant by abandoning its function, or by offering the same function with a radically different product
	R(1) - Rethink	Making product use more intensively (e.g., by sharing products or by placing multifunctional products on the market)
	R(2) - Reduce	Improving production or use efficiency by consuming less natural resources and materials
Extend the life of the product and its parts	R(3) - Re-use	Reusing by another consumer of the product that is not needed for a previous user but is still in good condition and performs its original function
	R(4) - Repair	Repairing and maintaining a defective product to be used for its original function
	R(5) - Refurbish	Recovering an old product and upgrade consumption
	R(6) - Remanufacture	Using parts of a discarded product in a new product with the same function
	R(7) - Repurpose	Using a discarded product or its parts in a new product with another function
Materials' useful application	R(8) - Recycle	Recycling materials to obtain the same (high grade) or lower (low grade) quality
	R(9) - Recover	Burning materials by energy application

\*Source: Compiled according to Potting, et al. (2017).

Table 2

Structure of the circular economy\*

Levels	Design	Production	Consumption	Waste management	Development support
Micro-	Ecodesign	Environmentally-friendly production Packaging and Logistics	Green purchase and consumption Shared economy (Sharing)	Product re-circulation system	Policies and laws, Information platform, Capacity building; application at all levels
Macro-	Ecological industrial park	Ecological industrial park Agriculture ecosystem	Ecological park	Waste trading, industrial parks	
Meso-	Regional eco-industrial network	Regional eco-industrial network	Rent, service	Symbiosis of urbanization	
Mega-	Global circular value chains (including global recycling chains)				

\*Source: Compiled by the Author based on Zvorych (2017).

As for the meso-level, this is usually associated with regional industrial networks as well as cross-sectoral cooperation.

Researchers Saidani, Cluzel, Leroy, & Auclair (2016), Balanay, & Halog (2016), and Banet (2016) focused on the selection of only three of these levels. However, Zvorych (2017) highlights the mega-level that includes global circular value chains (including global recyclables).

Huamao and Fengqi (2007) investigated circular economics in terms of systems theory, paying close attention to its levels. Thus, according to them, all levels of the circular economy are "interdependent, interactive and mutually limited". As emphasized by Huamao and Fengqi, "the levels of the circular economy must influence and interact with each other, and the higher levels take as base the low levels and control the development of the latter".

However, according to Lieder and Rashid (2016), the discussion level of the circular economy is very granular and rarely touches on the operational component. At the same time, Ghisellini, Cialani, & Ulgiati (2016) confirmed that the current indicators are hardly oriented to circularity at the scale of individual products. Besides, there is a lack of connection between the three levels of realization of the circular economy.

It should be noted that, in our view, it is crucial to have an awareness of the tools available to make the changes that would contribute to the development of the circular economy at different levels. See the pyramid with a micro-level at the bottom - the level of a consumer or a company (see Fig. 1 below), which is the most challenging level since it means transforming the "molecular" basis

of the economy into fundamentally new content. After all, the circular economy is a system where raw material flows are effectively managed, processed, and performed entirely based on renewable energy sources. Any actions do not adversely affect human lives and ecosystems within the formation and functioning of the global circular value chains.

One of the significant challenges facing management in implementing the principles of the circular economy is the unanticipated results and consequences (Lawrence, & Lorsch, 1967; Donaldson, 2001), and this leads to the need of conceptualization of change and structural adaptation of resource redistribution in the environment. Therefore, the replacement of business models is the basis of new approaches to manage a company. From this perspective, companies should create or add value by configuring or reconfiguring new or available resources (Mentink, 2014). According to some scientists, structural changes are inherent in most companies. They recognize that companies regularly rethink how they combine resources and the production process and, as a consequence, continuously redistribute internal resources to compete in increasing environmental demands (Galbraith, 1977; Drazin, & de Ven, 1985). All that usually requires a shift to the circular business model, with high upfront investment and longer time horizons to generate revenue. These requirements may entail additional business challenges for entrepreneurs as they may need vast capital reserves to "wait for the money". Also, it may be challenging to obtain shareholder approval for such business models as this approach does not meet the short-term shareholder expectations for dividends.

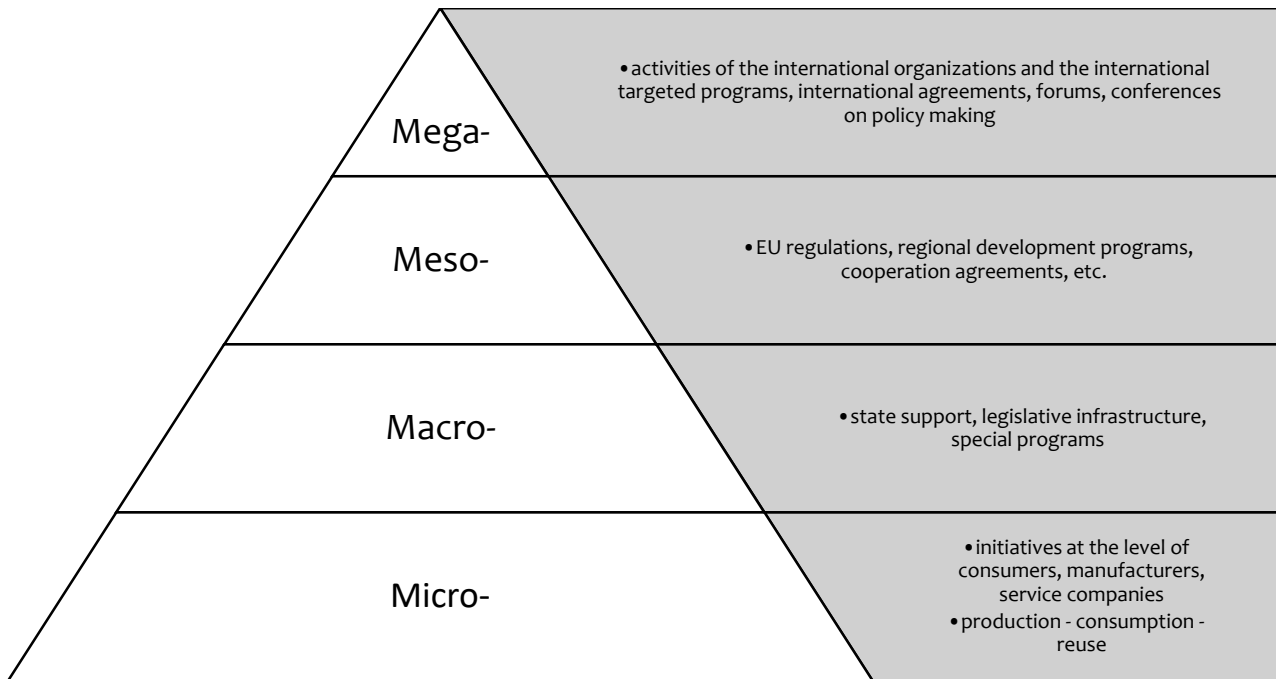


Fig. 1. Instrumentation for such transformations at micro-, macro-, meso- and mega-levels for development of the circular economy\*

\*Source: Compiled by the Author.

Studies have shown that as the high cost and risky implementation of the circular economy constraints the introduction of new business decisions, managers are not clear about growth potential (Baird, & Thomas, 1985; Eisenhardt, 1989; Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece, & Winter, 2007; Lozano, Suzuki, Carpenter, & Tyunina, 2017) through the adaptation of the circular business models.

The slow start of implementing the circular business model is inherent in established companies through organizational inertia and resistance to radical change. Companies’ managers that continue to work with the linear model can plan and forecast their futures based on historical data, but there is limited value for company managers moving to the circular business model to rely on historical data to predict the future. So, managers are trying to imagine what business in the circular economy will be.

The limits of resource and energy use and the importance of revising value creation in terms of closing cycles (i.e., systems that minimize waste) lay the groundwork for justifying the circular economy. The implications of this argument are significant: many companies may need to change their entire value chain. In this context, one of the most challenging problems is to create and organize a reverse value chain activity that encompasses all types of company activity from the return to the potential recovery of the maximum value through recycling. Thus, the production cycle is extended, so managers hesitate to make innovative changes (Chuang, Wang, & Zhao, 2014; Govindan, Soleimani, & Kannan, 2015).

On the other hand, the transition to the circular model can offer great opportunities, including cost savings via waste reduction, better supply chain management, less sensitivity to price volatility for resources, and more extended, better customer relationships. The transition to the circular economy also boosts incentives for innovation, creates jobs, and fosters environmental development (Kok, Wurpel, & Ten Wolde, 2013). Accordingly, as decisions about structural business change are taken by senior management, the creativity, potential, and commitment of top executives are significant factors for research examining the transition to the circular business models.

Uncertainty about the effectiveness of the new circular economy business models means that companies run their risk of contracting high unforeseen costs. There is a specific risk that

managers are not competent to form contracts that are sufficiently detailed to support their interests or to enter into contracts with too much complexity as they cannot even imagine the problems they may face during the transition to the circular economy.

However, based on the theory of transaction costs in the partnership’s management allows making mutually beneficial conditions in the formation of new contracts (Williamson, 1991). This theory allows understanding how companies can successfully close the problem of resource use and develop close collaboration. The “B to B” collaboration enables companies to work together with their partner companies in the value chain and adapt to market pressures arising from the challenges of sustainable development and increased environmental responsibility. Therefore, the accounts accuracy degree that companies can provide in certain external transactions (Argyres, & Mayer, 2007) potentially reduces the high contract costs (Leiblein, & Miller, 2003; Mayer, & Argyres, 2004). Thus, the competence to develop contracts that are sufficiently specific to the circular economy can be a decisive competitive advantage determining how successful they are in creating value under new economic conditions (Domingues, Lozano, Ceulemans, & Ramos, 2017). When implementing the principles of the circular economy for management and business practice, it is essential to understand the entire potential supply chain, in particular, such conditions as the utilization and extension of the stability of services, as well as its structure (i.e., individual companies and their relationships).

The transition from a linear to the circular business model, with the increased efficiency, utilization, and sustainability, may require additional investment for all parties to the economic relationship involved in the joint venture of a particular company. For example, the Danish Carlsberg brewery has created a collaborative network by engaging its suppliers and partners to make the circular alliance for the development of sustainable, recyclable packaging material and to convert existing material to a higher value by removing chemicals and additives (Hower, 2018). Carlsberg is the initiator of the transition to the circular model, and its staff has the specialized knowledge and resources they bring to the alliance. As a consequence, functional responsibilities in the business model are shared among all network members on a mutually beneficial basis: Ball corporation has experience in canning, Arekema in a glass bottle, O.I. in glass packaging, RKW in heat shrink film, WestRock

in cardboard multilayer packaging Petainer in polyethylene terephthalate (PET) kegs. As all parties coordinate their efforts to achieve concrete investment outcomes, which value depends on successful cooperation (Granovetter, 1973), this mutual obligation should reduce the risk of selfish behavior of the parties to the alliance and facilitate the protection of their interests. In this way, circular networks can reduce transaction costs resulting from contracting and control mechanisms.

For manufacturing companies, the first step in moving to the circular economy may be to redesign products so that they become suitable for recovery (Linder, & Williander, 2015). There may even be several products that can be started, which are adapted for partial restoration via optimization (e.g., products are designed to be assembled as quickly as possible without disassembly) (Sundin, & Bras, 2005). Products must be designed from environmentally friendly raw materials, with parts and components that are acceptable for further transformation, and product design should facilitate reuse and recycling (Eisenhardt, 1989). The importance of design relates not only to product features but also to the minimization of energy and resource consumption during production (Mitra, & Datta, 2014; MacArthur, 2013).

According to the recommendations of the Ellen MacArthur (2013) Foundation, the basic principle of the circular economy is that products must be designed in such a way that there was no waste, which means that products must be designed and optimized for the disassembly and reuse cycle.

The new business model's development depends on the investor companies, but the success of their implementation based on the circular economy is that all participants in the process are ready for change. Therefore, the company employees must participate in the analysis of the product life cycle, which provides an assessment of the product's environmental impact during different stages of their life cycle. In order for changes to be successful and new contracts to be defined, it is vital that employees' interests are aligned and that employees are motivated to overcome their resistance to change.

It is vital for a manufacturer seeking to move to the circular economy to convince and demonstrate to all involved companies that these changes will benefit. For an investor, a project related to direct investment, such as the creation of factories and businesses, carries considerable risk (Mutha, & Pokharel, 2009). Because significant investments are needed to rebuild products, large companies with access to more resources are more likely to meet the criteria of the circular economy. Besides, effectively addressing the challenges that may arise following the introduction of the new circular business model is likely to be difficult due to the contractual uncertainty. Parties that are unable to determine all the details of the contract may need to include penalties or fees to account for violations that may occur to avoid the conclusion of comprehensive contracts.

Thus, big companies can have the benefits of installing a contract program and can be involved in the essential parts of the transition to the circular business model. Compared to small companies, they are better able to organize the activities needed to achieve system-wide change, adequate R&D investment, and influence policy-makers to support the transition to the circular ecosystem through financial support and regulatory action (MacArthur, 2014).

Although small and medium-sized enterprises (SMEs) can enter into (often global) value chains and realize the benefits of the circular economy, they must meet the requirements that bigger companies define in contracts (Rizos, Behrens, Kafyke, Hirschnitz-Garbers, & Ioannou, 2015; Rizos, Behrens, Van Der Gaast, Hofman, Ioannou, Kafyke, Flamos, Rinaldi, Papadelis, & Hirschnitz-Garbers, 2016). However, because of the contract adaptation limitation, the uncertainty surrounding the circular economy and the complexity of developing profitable circular business models beforehand, a

joint steering committee consisting of companies with joint authority over a limited number of activities may offer an alternative when not dominant companies are involved in creation of new collaboration systems for the new business model implementation.

In order to determine the companies' ability to move to the circular business models, it is crucial to consider partner characteristics, contracting options, and ways to adapt companies to uncertainty and prevent potential disputes through contracts and contractual means. It should be noted that the circular conversions for business are significant investments. Therefore, it is vital to have state support and favorable macro-environment conditions and macro-level infrastructure.

As already mentioned, quite a lot of works of local and international scientists, especially Chinese, are devoted to the role of the state in the development of the circular economy. However, in this context, we would like to pay particular attention to the work of the Council on the Environment and Infrastructure of the Netherlands (Rli, 2015), "The circular economy. From intent to implementation" (Rli, 2015). To achieve the transition to the circular economy, the Council formulated several recommendations for the state. At the same time, the Council warns that this does not mean that it favors a top-down approach to the development of the circular economy.

On the contrary, it has repeatedly called on the parties to cooperate, which should be not only top-down but also bottom-up and horizontal. The more people at the state level know what is happening at the regional level, and the more they study the situation, the more they will be motivated to exert influence. This principle formed the basis for recommendations to the state, which can be briefly formulated (Table 3).

As one can see, the leading countries are drawing the attention of governments to the need for comprehensive business support on the path to the circular resource efficiency.

Concerning the implementation of the circular economy development strategy, the most versatile and comprehensive example, in our view, is the European Commission's activity on this issue, which during 2011-2015, presented several important resource efficiency initiatives, culminating in the Circular Economy Package" (Viykman, & Skonberg, 2016), adopted in December 2015.

In addition to the fundamental one - changing the minds of the producer and the consumer - it is equally essential for the circular economy to establish close cooperation between industry, researchers, and government.

Scientific research is intended to create new business models and product samples that will, from the beginning, include the need for easy maintenance, reuse, and further processing.

In recent decades, the European Union has introduced extensive legislation on waste management, which has led to dramatic reductions in air, water and soil pollution in E.U. countries, while boosting economic growth and creating jobs in waste collection and treatment.

Strategies for the circular economy development are actively implemented at the mega-scale, in particular, by the initiatives of international organizations (Table 4). First, the Ellen MacArthur (2013) Foundation, an organization that conducts research and publishes essential reports on the state of transition to the resource efficiency on a circular economy basis, should be noted. The Fund emphasizes interdisciplinary approaches based on projects and participation of both formal education and non-formal education. Focusing on online platforms, the Foundation provides the understanding and resources to support training in circular economies and the systems thinking necessary to accelerate the transition to circular economies.

Table 3

Basic recommendations for the circular economy development of the Council for the Environment and Infrastructure of the Netherlands\*

#	Recommendation	The recommendation beneficiary
1.	Make the transition to the circular economy is one of the essential pillars of the government policy and develops a standard nationwide "circular economy" program.	State
2.	Develop a shared vision and include it into the annual national budget memorandum	State
3.	Formulate common goals based on a shared vision and considering the country strengths	State
4.	Using common goals as a starting point, develop an approach for each ministry, based on its inherent strengths and the strengths of the Netherlands.	State
4a	Promotion of investments in sectors and prospective chains that can serve as a chair for the Dutch circular economy	Minister for Economic Affairs
4b	Development cooperation: Developing the circular economy-oriented trade policy by implementing the so-called raw material package and exporting knowledge related to circularity in the Netherlands	Foreign Minister for Foreign Trade
4c	Providing the right environment for the circular economy in terms of infrastructure, logistics, health, and the environment	Minister and Secretary of State for Infrastructure and Environment
4d	Make an excellent example of the implementation of the circular procurement and sourcing policies, as well as the monitoring of the circularity of buildings (public and government buildings); use the circular economy theme for further work ("Urban Program")	Minister for the Interior and the Minister for Housing and Communal Services and the Central Government
4e.	Include circular economy in the annual National Budget Memorandum, encourage the financial sector to finance the transition, prevent blockages that impede the greening of the tax system	Minister and Secretary of the State
4f	Ensure continued attention to the circular economy in the various curricula and educational curriculum	Minister and Secretary of State for Education, Culture and Science
5.	Study the social consequences of eliminating companies as a result of their disappearance in the circularity and, if possible, include them in the Transition Agent	State
6.	a. Make the transition to the circular economy as a political pillar and formulate a shared vision as the first step towards this goal; b. Drawing on a shared vision, formulate several common goals; c. Using common strategic goals as a starting point, develop an approach for each government.	Provinces, regions and (cooperating) municipalities
7.	a. Choose the circular strategy based on the inherent qualities of the region for the surrounding territories. To this end, develop an understanding of the qualities, circumstances, and characteristics of the region and record the flow of raw materials; b. Next, develop a complex based on four main circular strategies: "Zero Waste Area," "Sharing Area," "Regeneration Area" and "Industrial Symbiosis"; c. Determine what elements need to be organized at the local or regional level: local or supra-regional.	Provinces, regions and (cooperating) municipalities

\*Source: Generalized Author based on Rli (2015).

Table 4

Leading international organizations active in the development of the circular economy in the world\*

Organization	Activities in the circular economy development
The Ellen MacArthur Foundation	The Ellen MacArthur Foundation was launched in 2010 to accelerate the transition to the circular economy. Since its inception, the charity has become a world leader in thought, setting the circular economy on the agenda of decision-makers in business, government and academia. With the support of its core charitable partners SUN, MAVA, the Postal Lottery and the Eric and Wendy Schmidt Foundation for Strategic Innovation and Knowledge from Arup, Dragon Rouge Ltd, IDEO and SYSTEMIQ partners, the Foundation focuses on six interrelated areas: 1) Training, 2) Business, 3) Institutions, Governments, and Cities, 4) Insight and Analysis, 5) System Initiatives, 6) Connection and Communication
U.N. Trade and Development Conference (UNCTAD, UNCTAD)	UNCTAD's work on the circular economics began in 2015 with collaboration with the Ellen MacArthur Foundation on the potential for resource circulation in large economies such as India and China. This work is the result of UNCTAD's long-standing results in the trade aspects of resource-intensive sectors such as biofuels, biodiversity, and fisheries.
World Economic Forum (WEF)	For several years, the World Economic Forum has partnered with the Ellen MacArthur Foundation to accelerate the transition of the circular economy through MainStream Project - an initiative led by the CEO to help drive innovation in the circular economy. Building on this work, the PACE Circular Economy Accelerator Platform was launched in 2017 as a public-private collaboration, teasing its CEO, Philips, UN Global Ecological and Environmental Managers, Ellen MacArthur Foundation, International Resource Panel, Economics Panel and an emphasis strategy as a knowledge partner. The World Economic Forum accepts and promotes the Platform.
Organization for Economic Co-operation and Development (OECD)	The OECD RE-CIRCLE project provides policy guidance on resource efficiency and the transition to the circular economy. It aims to identify and quantify impact policies to guide a range of stakeholders in OECD member countries and emerging market economies through quantitative and qualitative analysis.

\*Source: Compiled by the Author.

Since its inception, the Foundation has partnered with its global partners (Danone, DS Smith, Google, H&M Group, Intesa Sanpaolo, Philips, Renault, SC Johnson, Solvay, and Unilever) to develop large-scale circular business initiatives and address their implementation challenges. The Fund also cooperates with

governments and municipal and international institutions to inform policy-makers and support mechanisms for public-private cooperation. Circularity is already part of many areas of UNCTAD's work, such as fossil fuel and fishing subsidies. UNCTAD is working on the circular economy, encouraging discussions and activities to



derive value from waste streams, encouraging discussions around emerging economic sectors, exploring innovative business models, and promoting consumer awareness and behavior change. In partnership with other international organizations, UNCTAD's work on the circular economy at the national and multilateral levels brings this critical topic to the service of the international community.

Concerning the World Economic Forum, its PACE platform focuses on changing systems at speed and scale, enabling partners to:

- develop mixed models for financing circular economy projects, in particular in developed and the developing countries;
- create and establish conditional policy frameworks to overcome specific barriers to the circular economy advancement;
- involve private and public sectors in public-private cooperation to scale the impact around the circular economy initiatives.

Currently, the PACE Global Leadership Group is comprised of over 40 leaders, ministers, and heads of international organizations who are required to maintain a portfolio of projects and activities. The main areas of the project are plastic, electronics, food and bio-economy, business model, and market transformation in China, ASEAN, Europe, and Africa.

International value chains cannot facilitate the circulation of resources by merely promoting and enforcing national rules. Although companies have succeeded in improving their social and environmental impact, the privatization of public policy through voluntary standards of sustainable development and corporate social responsibility (CSR) does not meet these objectives. In a world where most of the trade is in parts and components in highly globalized value chains, the promotion of global resource circulation occurs through international rules and cooperation, as well as educated individuals and consumers.

## 5. Conclusions

The circular economics concept implies direct involvement in the planning and development stages of goods to ensure a long life cycle and a high potential for further reuse, modernization, recovery, and recycling. Therefore, the necessary rethinking of the product life cycle, phases of end of life, and extraction of raw materials may not be present in a truly circular vision.

It is revealed that there are many definitions and features of the circular economy that complicating a single approach to this concept conceptualization. On the one hand, such a discussion speaks volumes about the development of this issue and scientific research. On the other hand, it can lead to fundamental contradictions and bring about the collapse of this concept if the semi-circular, minimum circular, and others are used.

The concept of "resource efficiency management based on the circular economy" has been formed, which envisages that this is the implementation of measures for designing, production, supply and use of economic resources on the principles of maximizing their value and ensuring continuity of their life cycle with minimal impact on the environment. Consequently, only their productions provide for a re-life cycle for their products can be considered as circular.

There are several circular strategies to reduce the consumption of natural resources and materials and minimize waste production: smarter use and production of the product, extending the life of the product and its parts, and the application of the useful materials. For the effective implementation of resource-efficiency strategies on the circular economy basis, the availability of initiatives at micro-, macro-, meso- and mega-levels is a prerequisite. An important aspect is an availability not only of "top-down" but also horizontal, as well as "bottom-down" of communications and joint projects.

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